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FORTIETH ANNUAL REPORT

OF THE

SUPERINTENDING ENGINEER

PUBLIC HEALTH ENGINEERING DEPARTMENT
UNITED PROVINCES

FOR THE YEAR ENDED MARCH 31, 1935

ALLAHABAD:
SUPERINTENDENT, PRINTING AND STATIONERY, UNITED PROVINCES
1935

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Fortieth Annual Report of the Superintending Engineer, Public Health Engineering Department, United Provinces, for the year ended 31st March, 1935.

SOME estimate of the amount of work dealt with in this department may be formed from the following table :

Item no.	Nature of work	Amount involved in lakhs of rupees	Remarks
1	Duties under the Local Authorities Loans Act, 1914 and the Municipalities Act, 1916, i.e. the supervision and inspection of all open water works and drainage pumping stations.	68·62	This amount represents the turnover in revenue and expenditure on water supply, drainage and electricity supply and is made up as following :
2	Local works—		
	(a) Preparation of projects ..	23·42	27 detailed proposals.
	(b) Construction	2·50	Payments made.
3	Provincial works—		
	(I) *Miscellaneous*		
	(a) Preparation of projects ..	0·76	14 detailed projects.
	(b) Construction	0·36	Payments made.
	(c) Maintenance	0·09	Lucknow Gumti Weir, G. H. Canal Anti-Malarial Works and Allahabad Magh Mela maintenance.
	(II) *Allahabad district works.*		
	(a) Preparation of projects ..	3·34	53 detailed projects.
	(b) Construction	0·11	Payments made.
	(c) Maintenance	1·91	
	(III) *Central works.*		
	(a) Construction	0·15	
	(b) Maintenance	0·01	
4	(a) Advice free to local authorities ..	9·92	16 forecasts of cost with reports supplied free.
	(b) Advice free to Government Department.	3·65	12 forecasts of cost with reports supplied free.
5	Board of Public Health business :		
	(a) Examination of projects for urban works.	27·42	Projects were scrutinized.
	(b) Examination of projects for rural sanitation.	3·96	463 projects were scrutinized.
	(c) Checking progress on urban and rural areas works G. O. nos. 463/XI, dated the 6th February, 1931, 470/XI, dated the 6th February, 1931, 580/XI, dated the 11th February, 1931, and 490/XI, dated the 9th April, 1931.	8·10	Progress reports collected and consolidated for the Accountant General, United Provinces.
6	Examination of projects for provincial works.	6·05	Projects were examined.
7	Inspection and reports on works carried out by local bodies.	4·26	
8	Scrutiny of certain Municipal Budgets, G. O. no. 4718/XI—10-H, dated the 6th January, 1933.	425·79	Under head of revenue and expenditure ; water supply, electric supply, drainage, conservancy and sewage disposal, public works, public lighting, 291 budgets comprising original and revised schedules and budgets of 89 municipalities and notified areas were scrutinized.

	Revenue	Expenditure	Total
	Rs.	Rs.	Rs.
Waterworks.	30,33,000	24,03,510	54,36,510
Drainage.	48,188	62,439	1,10,627
Electric supply.	7,23,938	5,90,756	13,14,694
Total..	38,05,126	30,56,705	68,61,831

(2) The amount of money spent on works carried out by this department during the year totalled Rs.5·13 lakhs. The total value of works for which projects including preliminary proposals and forecasts of cost were framed amounted to Rs.41·09 lakhs for the year.

Fees.

(3) A total amount of Rs.46,966 was earned during the year in fees for works carried out for local authorities. These fees were levied according to Government order on item 2 of the table above. The fees earned on construction amounted to Rs.26,340, whilst the fees earned on preparation of projects amounted to Rs.20,626 making up the total above referred to.

In addition to the above fees a sum of Rs.3,182 was recovered for hire of tools and plant to contractors. A further sum of Rs.1,265 was realized as supervision charges on the value of work carried out in the workshops of the Well Boring Operations Division.

Budget of local authorities.

(4) The administration reports of 89 municipalities and notified areas which are submitted to this office show that a total expenditure of Rs.4·26 crores took place during the year, of which sum Rs.81·32 lakhs was for expenditure on public works. The larger municipalities who provide piped water supply spent Rs.95·46 lakhs in these supplies and the same municipalities also during the year spent a sum of Rs.78·56 on drainage works.

The total establishment charges of this department namely Rs.2,84,347 for the year under review amount to only 1·09 per cent. of the amount which local authorities spent on public works over which this department is required to exercise supervision prescribed by rules.

Developments.

The number of public water supplies has doubled since 1920. All the older stations have been reorganized. The number of sewage pumping stations has been increased from one to four and one municipal hydro-electric supply has been inaugurated. The capital invested in water supplies in the United Provinces is now considerably above three crores of rupees.

The establishment maintained by local authorities concerning which the Superintending Engineer's control must be exercised as regards appointments, leave arrangements, promotions and discipline under the rules now amounts to over Rs.3·75 lakhs per annum.

Since 1930 there has been an increase of office routine work of over 34 per cent. whilst the establishment has been reduced by more than 15 per cent.

The establishment charges of this department which amounted to Rs.3,69,870 in 1924-25 have been reduced by retrenchment to Rs.2,84,347 per annum for this year.

An appreciable amount of arrears now exists and the staff are frequently compelled to work on holidays and outside office hours. The demands from local authorities are increasing rapidly and there is a formidable list of work pending for which staff does not exist. Government have been informed of this state of affairs.

Legislation.

The amendment to the Act (28th October, 1933), has resulted in some interest being taken in private enterprise as regards water supply service. The Moradabad Municipal Board have handed over their supply to licensees who have already commenced operations and the Aligarh Municipal Board are negotiating on similar lines. Such enterprise necessitates a complete resurvey of the general rules for water supply. Draft general rules for preventing waste, misuse and contamination of water to take the place of the present inadequate rules were prepared and submitted for the consideration of Government. Standard specifications were also drawn up for water supply fittings with the same object in view.

Notifications no. 2399-I/XI—218-30, dated the 30th October, 1932, defining Audit officers' powers to impose a surcharge for irregular expenditure has caused more circumspection generally though so far no surcharge actually has been levied.

Loss of publicmoney

Examples of great waste of tax-payer's money have steadily increased and all the large cities in the province are affected. Strong exception was taken in the Legislative Council to the language used by the writer in his Annual Report for the year 1932-33 concerning such losses. The writer regrets that these rather strong remarks should have given an impression that they were meant to be disrespectful, and even more if they should have been thought to be meant to be offensive. The remarks were made solely in the interest of the tax-payer during times when there was the highest authority for believing that the financial stability of the province was seriously threatened.

The facts set forth in this report indicate the crippling extent of the losses which continue to be suffered and are increasing, and show how far attempts to get the local authorities to realize the necessity for curbing them have succeeded.

G. O. no. 531/XI—226-1926, dated the 18th February, 1928, is disregarded in many instances by municipalities as the following table shows. The tendency is for *boards both to under estimate the quantity of water consumed for municipal purposes* and to neglect crediting the undertaking with the cost of such water. This process confuses accounts and results in concealing how excessive the assessment ratings are. The table below shows the state of affairs :

Serial number	Water works	Quantity reported as consumed for municipal purposes	Amount credited to water works by Board	Total working charges per 1,000 gallons for the year	Cost of water used for municipal purposes based on total working charges	Rate for domestic metered supplies per 1,000 gallons	Amount which should be credited according to rate in column 7	Remarks
1	2	3	4	5	6	7	8	9
		Million gallons	Rs.	Annas	Rs.	Annas	Rs.	
1	Agra ..	175·950	21,994	2·18	23,973	4·00	43,937	
2	Allahabad ..	628·098	86,000	3·22	1,26,405	9·00	3,53,305	
3	Benares ..	167·242	41,987	2·03	21,308	6·40	67,177	
4	Cawnpore ..	372·266	44,671	1·93	44,672	5·33	1,24,011	
5	Lucknow ..	477·957	73,000	2·73	81,551	5·33	1,59,219	
6	Meerut ..	3·326	2,000	1·04	216	6·00	1,247	
7	Mussoorie ..	14·412	Nil	15·76	14,196	32·00	28,824	
8	Naini Tal ..	9·897	12,000	18·63	11,524	48·00	29,691	
9	Dehra Dun ..	Not supplied separately.	1,500	3·36	..	..	..	
10	Jhansi ..	3·810	2,143	5·03	1,198	9·00	2,143	
11	Mirzapur ..	54·740	13,685	0·53	1,813	4·00	13,685	
12	Muttra ..	21·862	8,265	4·17	5,567	10·66	14,232	
13	Fyzabad ..	15·018	2,500	3·86	3,623	8·00	7,509	
14	Hardwar ..	4·564	1,000	6·58	1,877	12·00	3,423	
15	Unao ..	2·140	..	3·52	471	5·00	669	

The urban public deserves much better service than it receives from the staff employed by the boards. Inspection reports of officers lose most of their value because there is often no servant of the board capable or willing to interpret these reports to members. Sometimes reports are even suppressed and never shown to members.

Few boards possess staff capable of drawing out projects to comply with the rules and which can be accepted for purposes of financial assistance by way of loans or grants. Consulting engineers, where their services can be obtained, are seldom employed. A very large amount of work is in this manner thrown upon this department which should ordinarily be undertaken by the Board's staff.

Delays in correspondence are frequent, sometimes it is not possible to obtain an intelligent reply to inquiries framed in the simplest language. A better knowledge of the rules and procedure is desirable.

Attention to law and rules.

Important sections of the Municipalities Act and the rules framed thereunder, namely, sections 129, 191, 192, 209, 210, 220, 224, 235, 267 and 268 should receive more attention. The frequent infringement of these is the subject of much correspondence and loss. Sufficient knowledge of these sections and the rules is indispensable to the boards' superior staff.

The returns which must be submitted by boards to this department under the rules contain many obvious mistakes and result in a volume of correspondence which could be avoided.

The ignoring of rules regarding the appointment, pay and promotion of staff requiring technical qualifications results in much loss. Frequently during inspections staff are found employed without proper sanction as required by the rules. Much correspondence takes place over such cases.

In the case of drivers sanction is not so often omitted as in the case of fitters and turners which class should possess superior qualifications to drivers.

Leadership in public bodies.

Many boards require some permanent steadying influence around which the most capable members might rally, such as would be afforded by a permanent

servant who by reason of his integrity and standing would carry that weight requisite to give a lead to the better elements. Indeed without such influence progress seems to be impossible in some cases. The success of local self-government at least as far as the utility services are concerned depends almost completely upon the employment of men of the above description and the problem to be solved is how such can be induced to serve the local authorities and how they can be protected from victimisation during the satisfactory performance of their duties.

WATER SUPPLY—GENERAL REMARKS

Inspection reports.

The Mechanical Engineer's inspections have resulted in much benefit in all those cases where his advice has been adopted. His inspections also have confirmed the views put forward regularly in these reports as regards the inadequacy of the plant to meet the enormously wasteful demand which is almost universal and the unsatisfactory staff and maintenance arrangements made by local authorities.

Mr. Cassé inspected thoroughly in detail the water works plant at all stations in the province and after exhaustively reviewing each undertaking prepared reports showing how defects in the management could be remedied, how losses could be avoided and suggesting lines on which the development of each supply should take place. These reports are of great value in that constructive proposals are made to deal with each point brought to light during the inspection. The reports are deserving of careful attention of each local authority concerned.

The Mechanical Engineer's investigations show that at the present time only three municipalities are in a position to accurately measure and record the amount of water which they supply to the public. This officer also has shown that of all the water supplies in the province only Fatehpur-Sikri is able to meet its present maximum day's consumption in an efficient manner, the uncontrolled waste in other places preventing such conditions.

Detection and measurement of waste.

The Mechanical Engineer personally carried out night tests with a view to measuring the quantity of water which is allowed to flow to waste in almost all the plains municipalities. These tests were carried out by pumping a supply from midnight onwards till 3 a.m. or later. To commence with, the consumption generally was as great as the maximum demand during day hours. In some cases little diminution was noticed even after several hours pumping, in others the consumption diminished somewhat and became steady between 2 and 3 a.m. The steady flow at such hours is a recognized measure of the total wasteful flow which occurs throughout normal pumping hours and is generally accepted as a criterion of the amount of waste. The tests were carried out in the cold weather and some actually when rain was falling.

At the same time as the consumption was being measured, house to house inspections were carried out and a large percentage of connexions were found to waste copious amount of water.

The results of such tests are tabulated below:

Water works	Total Annual charges Lakhs Rs.	Percentage of waste	Loss per annum Lakhs Rs.
1. Agra	2·06	51·53	1·06
2. Allahabad	4·16	71·62	2·98
3. Benares	3·33	53·53	1·78
4. Cawnpore	3·80	60·00	2·28
5. Lucknow	5·49	67·44	3·70
6. Meerut	0·35	40·54	0·14
7. Naini Tal	0·78	62·50	0·49
8. Mirzapur	0·11	63·00	0·07
9. Muttra	0·72	46·94	0·34
10. Fyzabad	0·46	63·49	0·29
11. Hardwar	0·42	45·00	0·19
12. Unao	0·12	26·67	0·03
13. Aligarh	0·28	41·67	0·12
Total ..	..	..	Rs.13·47 lakhs per annum.

The figures of annual loss are calculated at the actual cost of water assessed over the year, all charges included. This figure is much less than the selling value

of the water. The annual loss suffered by the tax-payers in these 13 municipalities must amount to Rs.13·47 lakhs per annum at a minimum. Some water supplies have been reduced almost to the point of paralysis by the waste which takes place.

The Mussoorie, Dehra Dun and Jhansi boards have not succeeded in carrying out tests and the Kosi Kalan and Fatehpur-Sikri supplies show small percentage of waste, both being standpost supplies only.

The alarming extent of the waste having been established, all boards were urged to deal with it immediately and G. O. no. 3824/XI—396, dated the 23rd November, 1934 together with G. O. no. 3978/XI—396, dated the 2nd January, 1935 was issued to all local authorities possessing public water supplies.

Meters were recommended as a sound means of regaining control over the supply and this proposal has called forth loud protests. Meters.

The main objections raised are that the cost of water will be increased, the consumer having to pay meter rent and that with the intermittent supply now in vogue meters will register air and the consumer may be penalized.

The first objection is invalid if the tax-payer will realize that he is already paying for more than twice as much water as he really uses and that the result of this saving will enable a reduction in cost to be made much greater than the cost of the meter.

The second objection cannot be sustained in those cases where the supply is continuous. In other cases where an intermittent supply exists meters in the first instance should only be applied in those districts where the pressure is high and the supply continuous until the distribution has been brought under proper control and a continuous supply made available everywhere.

Meters are, however, only one of many means by which a water supply must be controlled and waste prevented. If the general rules prescribed under the Act were applied justly and indiscriminately, waste would not occur to any marked extent. The pipe line inspections are seldom or never carried out. No night tests or night inspections were carried out until the Mechanical Engineer personally visited each water works and had the tests and inspections carried out in his presence. The staff employed by the boards were either prevented from carrying out this important duty or were incompetent to do it. Application of rules to prevent waste.

The use of inferior fittings is a fruitful source of waste, inferior work carried out by persons licensed as plumbers with no proper training is also a cause of much loss of water. Unauthorized connexions which are allowed to become defective and remain unrepaired are universally in evidence. The house cisterns prescribed under the Act are never insisted upon, the ferrule rules and the scale of taps are more often ignored than observed.

Municipal commissioners evince great reluctance in supporting the application of the rules although these rules have the force of law. They say that their constituents will not stand such a course. On the other hand inspecting officers have found that tax-payers are eminently reasonable in this matter, when it is explained to them that there is no design to curtail supply but rather to encourage the proper use of water, that waste prevention will enable a continuous supply with good pressure to be afforded and that a saving will result in maintenance as well as the avoidance of extra taxation to meet loans for extensions.

In one town where several wasting mohallas were dealt with by house-to-house inspections involving over 5,500 separate consumers, a reduction in the wasteful flow amounting to 23 per cent. was arrived at after a few weeks' work and a saving to the tax-payer of Rs.7,000 per mensem in value of water. In another town house-to-house inspections and warnings to consumers resulted in the wasteful flow being reduced by 30 per cent. within a month. In neither of these cases were meters used, the boards having expressed reluctance beforehand to their general application. There can be no excuse therefore for preventing the pipe line inspecting staff for carrying out their obvious duties and taking the consumer into confidence on an important matter of this description.

For large consumers and those who deliberately plan to waste or misuse water meters are the only remedy. For instance one case has been reported where a large consumer was found drawing off five times the quantity of water he was entitled to and cases have come to light where wealthy consumers have left their taps open, locked their premises and departed from town for periods of many weeks at a time.

The pumping plant in most towns is stressed to its utmost limit and many are worked beyond what is ordinarily considered safe for a public supply. Those towns which have inaugurated waste prevention measures have very beneficial results to show, the hours of pumping have been extended and in one case they have been made continuous, and in all cases where reasonable steps have been taken the distress owing to shortage in supply has become less than that in former years. The

persevering with waste prevention measures is the only alternative to the great expense of doubling or trebling the present water supply plant capacity in many towns.

Contaminated supplies.

The intermittent supplies combined with the neglected state of the distribution fittings and connexions are the cause of many unsatisfactory analyses of water in the large towns in the plains. When urged to increase the hours of supply and make them continuous, most boards demur, first because the plant is incapable of sustaining such a lengthy supply and secondly they object to the extra cost. Neither of these objections are insuperable. In the first place when proper steps have been taken to control waste, the plant nowhere will be found to be insufficient for legitimate demands and as regards the second objection it is a well known fact that with continuous supply the public use less water than with an intermittent supply and that the running costs for continuous supply are less than those for an intermittent supply.

Infringement of the Act.

The Cawnpore Municipality frequently infringes section 129(*b*) of the Act in that it derives Rs.4·47 lakhs revenue by assessment ratings, whilst the total amount spent on the water supplied amounts to only Rs. 3·80 lakhs.

Mirzapur Municipality similarly levies unduly high rates, for it derives a sum of over Rs.40,000 by rates whilst the cost of the water supplied amounts to less than Rs.11,500.

The rates which have been authorized by Government for metered supplies are in many cases high when compared with the actual cost of water.

The following table exhibits in many cases too wide a margin between the actual cost of water and the charge made. No public utility company would be permitted such a wide margin in the distribution of power or other commodities.

Rates for metered supplies

Serial number	Municipalities	For domestic purposes.	Excess consumption	For non-domestic purposes	For domestic and non-domestic combined	For building purposes	For railways	For cantonments	Total cost of water per 1,000 gallons
		Rs. as.	Rs. as.	Rs. as.	Rs. as.	Rs. as.	Rs. as.	Rs. as.	Annas.
1	Agra	0 4	0 6	0 4	..	0 8	0 10	..	2·18
2	Allahabad	0 10·6	0 9	..	..	..	..	..	3·22
3	Benares	0 6·4	..	0 8·8	..	..	..	..	2·03
4	Cawnpore	0 5·3	..	..	..	..	..	..	1·92*
5	Lucknow	0 5·3	..	0 10	0 10	..	0 6·75	0 7·2	2·73
6	Meerut	0 5	..	..	..	..	..	..	1·04
7	Mussoorie	2 0	..	..	..	..	..	..	15·76
8	Naini Tal	3 0	..	..	..	..	..	3 4	18·63
9	Jhansi	0 9	..	..	..	..	..	..	5·03
10	Mirzapur	0 4	..	..	..	..	..	..	0·53
11	Muttra	0 10·6	..	..	..	..	..	..	4·17
12	Fyzabad	0 8	..	..	..	..	..	..	3·86
13	Hardwar	0 12	..	..	..	..	..	..	6·58
14	Unao	0 5	..	..	..	..	..	..	3·52
15	Kosi	0 8	..	0 10	..	..	..	..	3·43
16	Fatehpur-Sikri ..	0 12	..	0 14	..	..	..	..	4·37

* Rate for water served beyond municipal limit annas 6 per 1,000 gallons.

Water is the cheapest commodity available to the public in these provinces. At the average cost of two annas per thousand gallons a consumer can be afforded a supply of about 60 maunds or about 300 *gharas* for one anna delivered on his premises. In former days this amount would have cost a householder Rs.5.

Drainage—General remarks

A great bulk of money sunk in drainage work affords little benefit owing to neglect to insist on the bye-laws being enforced preventing property owners from

discharging their foul water into the gutters of the public streets, there to meander into the nearest storm water channel. In some cases the sewers have become choked and the sewage is impounded to such a height that the storm overflows operate discharging crude sewage into open storm channels with attendant nuisance and menace to health.

The choking of sewers is almost always traceable to the surreptitious use of manholes by sweeper staff to dispose of the house refuse and the choking of sewers becomes very pronounced after a mistaken effort to economise in the number of bullocks for carting refuse. Where pumping stations operate, the unintelligent use of the pumping plant whereby the sewage is allowed to pond up in the sewers until it almost reaches the ground level and is then pumped out, is responsible for a considerable amount of silting and choking. This process can be observed even at Lucknow, Cawnpore and Allahabad.

Encroachments over street gutters and even over sewer lines and manholes are apt to occur in built-up areas and this defect is often traceable to neglect to take steps prescribed under the Act for acquiring roads and property and charging the cost of the improvement to the various frontages.

In carrying out drainage works it has often been noted that a number of the thoroughfares and roads along which drains had to be constructed vested in private ownership and that encroachments over the gutters and even over the sewer and the manholes were apt to take place. This defect is due to the local authority failing to take the steps prescribed under the Municipalities Act whereby the road may be taken up as public property and the cost of the drainage works charged to the various frontages.

The Board of Public Health have resolved not to sanction any drainage schemes in future which do not adequately cater for the prevention of encroachments and the taking over of thoroughfares along which public drains must pass.

OPERATIONS OF LOCAL AUTHORITIES

Water-supply—The last report on this water works shows that deterioration is still continuous. The recommendations made in inspection reports are still ignored. The night tests show that the permanent waste amounted to as much as 2·1 million gallons per day, that is to say, over 50 per cent. of the average daily consumption. AGRA.

Inspections disclose how large amounts of water are being wasted by consumers. Practically all the taps on garden connexions are allowed to run fully open and there were very few connexions that were not found defective. The sizes of the ferrules allowed are much larger than the supply for domestic purposes justifies and numbers of illegal connexions were discovered. Many connexions were found being used for non-domestic purposes, all of which were unmetered. Many other supplies for trade purposes are abused.

The drain flushing connexions are allowed to flow continuously often without any taps or means of shutting off the supply and flushing tanks are absent, the connexions are being allowed to continuously discharge direct into the drains.

Many complaints regarding tampering with meters are received, and of those meters in use a very large number are out of order.

Agreements with private consumers for trade purposes have resulted in much loss of revenue, one case has come to light where five times the quantity paid for has been supplied.

The pipe line and waste prevention staff is inadequate and unskilled. The post of second engineer has been kept vacant for many months. The water works superintendent is not consulted by the board regarding the appointments made to the staff which he is supposed to control.

The board, and some members in particular, constantly interfere with the management of water works affairs which should be left to the duly appointed officers. During hot weather large areas receive either no supply at all or a supply which is so meagre as to be almost useless.

The settling and filtration plant exhibits many defects and the potability of the supply is frequently questioned.

The board failed to initiate any proper system of metering or to make arrangements for spare parts or for replacing worn out plant.

The over-stressing of this plant combined with the excessive amount of waste which takes place and the failure of the board to take proper measures renders a public warning necessary as to the imminence of interruption in the supply during the hot season.

The pressure boosting stations both at the Fort and Rakabganj were completed by the Executive Engineer and after test were handed over to the municipal board in December, 1934.

The Executive Engineer, 1st Division, undertook the duty of inaugurating waste preventive measures and was provided with a sum of about Rs.50,000 for this purpose, the bulk of which is required to purchase meters.

AGRA—(concld.)

The power of applying the water supply rules in this municipality vests either in the board or in the executive officer so that without their co-operation progress in waste prevention cannot be expected. It was only when the Chairman gave guarantees that the rules would be applied that this work could proceed.

Tender forms were printed for the supply of meters and in the meantime house-to-house inspections in conjunction with night tests were carried out and it was found that the great majority of consumers in the low zone wasted unlimited quantity of water. Many had no taps but the greater number had leaky fittings and keep their connexions running continuously. In those mohallas inspected during the night tests between midnight and 3 a.m. the staff reported that they were impressed with the noise of water flowing everywhere. The guarantees given by the Chairman have so far not been implemented.

Grievous shortage takes place in the outlying districts such as Billochpura and the mental hospital there which is of provincial importance, has suffered greatly owing to shortage in the supply. The Executive Engineer reported fully on this matter and it was hoped that the board and its officers would render such assistance in reducing waste that the supply to these outlying areas would be greatly improved. This assistance, as before stated has not been forthcoming and it is likely that the mental hospital will be subjected to great distress again in the coming hot weather. Though urged to do so in many inspection reports the board have not fenced in the water works compound or prevented stray animals grazing and defiling the compound. This state of affairs is not conducive to preserving the supply from contamination.

The Executive Engineer drew up proposals for providing proper dosing arrangement for alumina ferric compound to the raw water as the present method is wasteful and often ineffective.

It is hoped that funds will soon be found for this necessary work.

Drainage—The board have not moved as regards the setting on foot the main drainage work for its municipality. This is urgently needed to improve the general sanitation of the town and to deal with the deplorable state caused by sewage discharged in the river-front on Strand Road and near the Fort.

The Executive Engineer advised the board concerning certain minor items of municipal works during the year.

ALIGARH.

Water supply—The board have taken no steps to provide the additional tube-well and pump set and the position of their supply is also precarious because of lack of spare parts, repairs and establishment.

There cannot be any doubt but that the present difficulties are also due to the waste which is allowed to take place owing to neglect to control consumption. All the public standposts have been shut down and the whole supply is now delivered to private individuals who pay only a fraction of the cost of the water they draw.

It is said that unauthorized persons even interfere with the ferrules so as to get more water than they are entitled to; no proper pipeline inspectors are employed.

The night tests show that 21,000 gallons per hour is continuously run to waste, that is to say, over 75 per cent. of the capacity of the pumping plant. During a test 138 cases were found where water was allowed to run to waste from fully open taps.

The returns of the board show that though all the standposts have been shut down yet no saving has taken place in the water-supply but even more has been drawn by the favoured private consumers.

The total supply as now retailed through private connexions amounts to over 50 gallons per head per day of the population in the homes served. The board appear unable to take steps to prevent the large losses which the tax payer is suffering owing to abuse of the supply by the favoured few.

In the original scheme 123 standposts were provided with fire hydrants to supply the poorer public. Owing to the absence of proper staff many of the gunmetal caps of these hydrants have been stolen and the board decided to remove the remainder and plug the rest with steel caps as well as to cut off all the standposts.

The fire appliances which the board purchased consist of a small floating pump and one inch flexible hose which is totally unsuitable for use on the 2½" hydrants even if they were operable.

All the staff which are employed under the water works superintendent are unqualified and inexperienced. The board has systematically starved the plant as regards maintenance and establishment and no spare parts are provided.

It is said that the board will shortly hand over this supply, which they have so markedly failed to manage to a private company. ALIGARH—(concld.)

Drainage—No drainage works of any consequence were undertaken during the year.

ALLAHABAD.

Water supply—Owing to short hours of pressure the bulk of consumers are compelled to supply their wants simultaneously. In addition to this, those consumers who are unfavourably situated as regards pressure are forced to keep their taps open continuously in order to collect even a meagre supply during the hours of pressure. The demand has now become so great that the plant is incapable of meeting it. The effective manner of reducing the maximum consumption is to increase the hours of supply, but in this procedure an almost insuperable difficulty is encountered owing to the enormous waste that takes place in those low lying areas where the pressure is high.

The pipeline staff take no systematic measures as regards controlling the supply, nor indeed are they qualified or experienced for such work. In these reports the necessity for metering has been repeatedly emphasized but at the present time there are many large connections which remain unmetered because no meters exist, and the board will not purchase any, though they make a large profit in water supply.

Some parts of the municipal area are not properly served with water and if mains are laid to supply these, such course at best will result in transferring the shortage to other areas.

The pumps are at present worked with the delivery throttled and it is probable that the board lose over two thousand rupees per annum owing to this method of pumping. The present capacity of the pumps barely exceeds 0·5 million gallons per hour, whilst the pumps were rated by the manufacturers to supply 0·675 million gallons per hour.

The Mechanical Engineer made proposals for an alteration in the method of working the filtration plant whereby its capacity could be increased from 0·395 to 0·627 million gallons per hour at little capital expenditure. So far this proposal has been ignored.

The Allahabad Taxpayer's Association has raised some weighty objections to the way in which the water supply is managed. It has drawn attention to the fact that a Tuberculosis Hospital has been erected immediately over the rising main from Karelabagh. The effect of a large infectious diseases sanatorium abutting on the water-works intake compound does not seem to have been taken into consideration by the municipality, nor indeed do they seem to realize that the granting of raw water connections from the crude water main to ice factories and schools must render nugatory the benefits of a pure water supply to the public.

The profit on the year's working amounted to 0·77 lakhs and similar profits have been maintained for some years past. It is difficult to understand the neglect of the board to put in hand the numerous repairs and improvements which have been recommended from time to time by inspecting officers.

The board was presented with a scheme for the prevention of waste by the Executive Engineer. A loan of 0·5 lakhs for this purpose was afforded by Government some months ago, but so far no steps seem to have been taken to put in hand these measures which would result in handsome saving and a better supply to the public.

Out of a total number of 358 meters, as many as 63 were out of commission at one time for repairs or adjustments.

The municipal board requested the Executive Engineer to prepare a forecast of cost for a fourth set at Khusroobagh and that officer is dealing with the request, but if the Board made proper effort to control waste, the expenditure required on another set would not be necessary for many years to come. The installation of an alum dosing plant has been recommended as a badly needed improvement.

Water supply extension—Of the two tube-wells which were constructed in the civil lines area to meet restricted supply there, the first on the Thornhill Road was completed in November 1934. This well, which it was thought would not be successful at the commencement, has now been successfully developed to afford about 400 gallons per minute.

The work on the second tube well at Katra has been commenced and the boring has now almost reached its projected depth. As soon as this well is tested, the project for the pumping plant for both wells will be completed.

Drainage—The board's request for advice regarding drainage improvements could not be promptly attended to mainly because a plan showing the drainage system as it exists at present is not available, and also because of pressure of other work. Lack of diligence in maintaining drainage works is evident by the delays in

ALLAHABAD—(*continued*).

carrying out repairs such as those in the wall of the engine room at the Jumna bridge pumping plant.

Drainage pumping station—The existing plant which was installed in 1916 is now reaching the end of its useful life and the board would do well to set on foot measures for replacing it by an electro-motor pumping plant. The existing sewage pumping main over the Jumna bridge still shows no serious defect, but the time has come when the second main, originally proposed, should be laid.

Sewage pumping station—Sewage is permitted to find its way into the Ganges still in spite of many complaints, and initiative in extending the sewage farm and treating the sewage properly is entirely lacking.

Fire protection—Mr. Cassé gave the board some valuable advice concerning the provision of an efficient fire fighting apparatus, but this advice does not seem to have been followed.

Central Jail water supply—In order to relieve the distress owing to shortage of water in the summer, a tube was sunk in one of the jail wells which has resulted in an appreciable increase in the supply. The question of installing a pumped water supply is under the consideration of the jail authorities.

Magh mela water supply—The oil-engine driven air lift and centrifugal pump was overhauled and afforded a satisfactory supply to the *mela* between 9th January and 5th February, 1935. The distribution was completed on the *mela* site well in time for the opening date on 7th January, 1935, and the supply was satisfactorily maintained throughout the whole *mela* period. Owing to financial stringency a sum of Rs.6,000 could not be found for providing chemical fire extinguishing appliances.

Magh mela electric supply—The overhead mains and appurtenant works were completed and tested and set to work in time for the *mela* and a satisfactory supply was afforded throughout the *mela* period.

Since the supply company have made use of the *mela* feeder line for supplying energy to Daraganj and Bairana mohallas it has been found possible to reduce the rent charges for this line from Rs.3,500 to Rs.2,500 per annum.

During this season the Ganges river level rose in such a manner as to cause the stream to swing through a considerable width of sand bed. Efforts were made to connect the *Sangam* with the *mela* area by a temporary bridge over a very swift channel of the Ganges. Although great efforts were made, this was only partially successful owing to the rapid manner in which the river changed its bed.

ALLAHABAD DISTRICT P. W. D. B. AND R. WORK.

The work taken over in April, 1933, constitutes 70 per cent. of the provincial division. The second year of this demonstration has been completed, the work of all the contractors employed proved satisfactory and the contracts were renewed for a further period of one year.

The establishment charges for this work were reduced to 17½ per cent. during the first year of working and during the second year in question were still further reduced to about 11 per cent. and the cost of the work was also reduced appreciably below the standard schedules. At the same time competent observers consider the works have not only been maintained in a favourable state, but their condition improved.

Compared with the average expenditure in the three years 1930-31 to 1932-33 an average saving in cost of works amounting to about Rs.28,000 annually has been made.

During the year 19 miles of metalled roads were renewed and 5 miles of treated roads were repainted. Owing to high floods in August, 1934, the wing walls of the Mansaita *nala* bridge were damaged and special repairs had to be undertaken.

The pontoon bridge at Jhusi was dismantled in June, 1934, after which a ferry service was maintained until the 12th November, 1934, when the pontoon bridge was re-opened. The river current throughout this season tended towards the east bank and at times caused some anxiety owing to the frequency with which the pontoons had to be extended in numbers on that bank.

The maintenance of government buildings was satisfactorily carried out and the special repair works due to the earthquake damage were also completed.

The maintenance of the electric installations of the High Court and other government buildings was arranged on yearly contract; the Alfred Park pumping station, the Rasulabad Distillery, the Bukshi and Beni Bunds as well as arboricultural operations and other miscellaneous works were also completed satisfactorily.

The reorganization of the Rasulabad Distillery water supply was completed in May, 1934, resulting in a doubling of the supply of water and reduction in the maintenance charges by Rs.300 per annum.

Certain works in connection with the improvements of the acoustics of the court rooms in the High Court were effected during the year. ALLAHABAD DISTRICT—(*concld.*)

The construction of the aerodrome office at Bamrauli on behalf of the Government of India Aviation Department was carried out at short notice and completed in time for the England-Australia Air Race and a well was bored at this aerodrome which afforded an adequate supply to the public attending the race.

The roof of the Mayo Hall which was destroyed by fire in April, 1934, will be replaced as soon as funds are received.

The construction of a police station at Sarai Aqil is under consideration.

Water supply—Some shortage in supply of water at Almora is complained of owing to the spring on the Sihai Devi mountain diminishing in the hot weather. Certain alternatives have been drawn up for extending the supply but the board do not seem to be able to account for that water which is supplied from the existing sources and though they have been requested, so far they have not succeeded in carrying out a night test to show how much water is being wasted. ALMORA.

Since the board does not employ literate staff capable of preparing even simple returns it is not an easy matter to advise it as regards the maintenance of the supply.

Water supply—The second well intended for public water supply at Ajodhya has been completed and is in process of testing. The well promises to yield as much as the former one completed in 1931. Each well will afford a supply of 350 gallons per minute and both together will be sufficient to assure an adequate water supply at Ajodhya both to the resident population and to pilgrims during *melas*. AJODHYA (DISTRICT FYZABAD).

Water supply—The board employs unqualified and illiterate staff and there is no possibility of obtaining any reliable records concerning the functioning of this water supply nor is there sufficient staff available in this department to make that number of regular inspections and observations from which the performance of the plant might be deduced. BAHRAICH.

The board contemplates a comprehensive supply to the town and the Executive Engineer is preparing an estimate for the work at the request of the board.

Water supply—Since the Municipal Board of Bahraich found itself unable to raise the necessary funds the Board of Public Health decided to consider a separate scheme for supplying the *mela* with water. A project amounting to Rs.45,000 is at present under consideration. SYED SALAR FAIR (BAHRAICH).

This municipal board was provided with a forecast of cost for a meat market but so far does not seem to have been able to come to any decision on financing the work. BALLIA.

Water supply—The Bara Banki Municipality were furnished with a forecast of cost amounting to 0·8 lakhs for improvements in the town's water supply but apparently this board is not in a position to finance the work. BARA BANKI.

Anti-malarial works—The third and last instalment of this work was satisfactorily completed and handed over to the municipal board. BAREILLY.

Water works.—There are no bulk meters from which any reliable measurements may be made of the filtered water pumped into the distribution, such records are obtained by calculations and deductions from the crude water pumped over the weir to the settling tanks. Steps have been recommended for providing proper meters to keep a check on the actual consumption. BENARES.

A further serious defect in the maintenance of this water works is the lack of level controlling apparatus for the sand filters.

The filtration plant is subjected to great fluctuations in head owing to lack of storage for filtered water and the water analyses are usually unsatisfactory. Pressure regulating gears have now become indispensable.

There is no adequate storage in the distribution system and all water is supplied by direct pumping, the result is that during hours of maximum demand the pumps are unable to maintain the requisite pressure. Owing to fall in pressure the pumps deliver much greater quantity than they were designed for. The method adopted in controlling the flow by throttling the delivery of the pumps is wasteful and the Mechanical Engineer has shown that if the three pumps are throttled on an average three hours per day, a loss of over Rs. 4,000 would take place in consumption of electricity during the year.

The distribution has been divided into two zones of supply into which the pump deliver directly. The lower portions of the area get almost a continuous supply and during the time when the pumps are not working practically all the water in the mains is drawn off. This results in contaminated matter being drawn into the mains affecting the purity of the supply. Tentative measures to control the supply were put in hand and meters were applied in a number of cases to establish whether the excess quantity of water consumed if charged for from the consumers would pay for the cost of the meters. The observations show that the excess quantity used

BENARES—(*concld.*)

about covered the maintenance charges of the meters but such steps merely result in toying with the vital question of preventing waste. It is urged that warnings should be issued to the public and those consumers who regardless of such warnings persistently waste water should be dealt with under the general rules.

The municipal authorities have succeeded in obtaining a loan of Rs.50,000 for meters in order to set on foot energetic measures to prevent waste.

Night tests and house to house inspections are now being regularly carried out and the question of providing more pipeline staff to extend these activities is being considered.

Drainage—The contamination of the *ghats* owing to discharge of sewage on the river front has now assumed alarming proportions and many complaints have been received concerning this well-nigh intolerable nuisance.

A survey of the river front disclosed that there were 32 separate points at which crude sewage is being discharged into the river between Asighat and the Dufferin railway bridge. The majority are not large flows, but several, especially the Dassasumedh ghat, amount to some cusecs. It was estimated that roughly four lakhs of rupees would be required if pumping stations and intercepting sewers were constructed to collect and pump this sewage into the existing system and that recurring charges of no negligible amount would also have to be met. An endeavour was made to trace out the origin of the sewage but owing to the loss of the original drainage plans, sufficient information could not be collected.

The examination carried out by Messrs. Lane Brown & Hewlett, Consulting Engineers, established the fact that the great bulk of the discharge on the river front was due to the choking of the main sewers by debris which seems to have found its way into the sewers by unauthorized use of manholes for disposing of rubbish. The choking of the sewers resulted in the sewage being held up to such a level that the storm reliefs operated and it is through these storm reliefs that much of the fouling of the *ghat* occurs.

With the assistance of the firm of consulting engineers the principal of which was responsible for the construction of the system between 1903-1905, it was also possible to establish the scope of the original drainage work and an index plan showing this has been prepared which will be very useful in reinstating the sewers. Practically all the smaller points of contamination are due to the failure to bring the drainage bye-laws into operation and to compel property owners to connect to municipal drains. A report was drawn out summarizing the information obtained and presented to the municipal authorities with recommendations as to the best methods of procedure in doing away with the wholesale fouling of the *ghats*.

Proposals are under consideration for farming the sewage from the outfall instead of allowing it to flow into the Ganges.

The Executive Engineer gave advice to the Udai Pratap College authorities concerning water supply and drainage improvements.

BINDHACHAL (DISTRICT MIRZAPUR).

Water supply—A search for a possible source of water is in hand so that a public supply may be inaugurated. Investigations so far show that percolation wells instead of tube-wells would probably offer the best solution. Owing to the outcrop of rock near the surface it will be difficult to obtain a sufficient depth of water bearing deposit to afford the requisite supply. For this reason surface wells or galleries in the vicinity of the Ganges river bed are to be tested.

BINDKI (FATEHPUR).

Water supply—The Notified Area Committee approached this department to carry out a general survey of the town as a preliminary to having a drainage work carried out. Owing to pressure of other works it is regretted that the committee's request could not be attended to.

BIJNOR.

Drainage—The municipality has asked the Executive Engineer to assist them in regard to their drainage works but the Executive Engineer reluctantly had to decline to afford this assistance owing to shortage of staff.

BRINDABAN.

Water supply—In past years efforts have been made to discover a suitable source for a water supply to Brindaban and the *melas* that are held there. Three bores carried out in the vicinity of the municipal area resulted only in brackish water being found or fresh water in such small quantities as to be totally inadequate. The Executive Engineer, 1st Division, after survey of all the work done to date and a thorough reexamination of the area applied for permission to construct *infiltration* wells in the bed of the Jumna in a well defined sand bed on the right bank.

Three trial bores were constructed and in one of these over 22 feet thickness of water-bearing sand was met with. This stratum overlies a clay bed under which it is known that brackish water exists.

The Board of Public Health have given a grant of Rs 13,700 for testing the yield of water available from such wells. It is probable that this sand layer will

solve the problem of a water supply to Brindaban which has baffled searchers so long.

BRINDABAN—(*concld.*)

Drainage—As regards the main drainage of the town, no development took place during the year but some improvements were carried out to a storm drain in the vicinity of the infectious diseases hospital, funds being made available by the Board of Public Health.

Efforts to provide the infectious diseases hospital with a supply of fresh water proved abortive—a small trial boring yielding only brackish water.

BUDAUN.

Drainage extensions—The third instalment of the drainage work for Budaun was put in hand and by the end of March, 1935, more than half the work was completed.

The improvements are so marked that the public demand for all lanes and streets to be paved and drained has become more insistent. The board is considering ways and means.

CAWNPORE.

It is questionable whether the water said to be delivered can be pumped with the pumping plant in its present condition and the accuracy of the venturi meters is doubted. It would appear that the supply is unduly limited and that a minimum pressure only is applied.

To meet the existing demand, which consists largely in flow to waste, the distribution system and the reservoirs are entirely inadequate; attention has been drawn to this in many inspection reports.

Schemes for reorganizing the distribution have been considered but the fact has been lost sight of that the mere laying of pipes is not likely to cure the present state of affairs and at best will only result in transferring the shortage from one area to another.

The Mechanical Engineer has pointed out that the system of pumping water by throttling the pumps is very wasteful and that a sum of nearly Rs.7,000 per annum is lost by this procedure.

The Mechanical Engineer has fully discussed the present circumstances and has made recommendations showing how expenditure on additional plant can be avoided without inconvenience to the public and how a continuous supply can be provided at reduced cost to the consumers.

The water rate assessments are much higher than the cost of water justifies and for many years past the board has been deriving a great profit from the water supply and not using it for the purpose contrary to the stipulations under section 129(*b*) of the Municipal Act, 1916.

Owing to the policy of the board in meeting expenditure of a non-recurring nature from revenue, no loans have been taken for some years and it would appear that the undertaking is being needlessly starved of funds to cover replacements and extensions and that necessary margin in plant and machinery, which is essential to the continuity of the supply.

Tests carried out show that the waste which takes place at Cawnpore is of phenomenal dimensions and results of tests and house-to-house inspections show that the distribution is in a deplorable state and that less water is put to the legitimate use than is run uselessly down the drains.

Drainage—Complaints concerning the nuisance in the Sisaman Nala have become very frequent of late and this nuisance is due to the inadequacy of the pumping plant at the Parmatghat sewage pumping station to deal with the present flow of sewage. The result of this is that sewage is headed up in the sewers to a height of 20 feet or more causing a backing up for many miles and overflow through the storm reliefs into the open storm channels.

The board was warned some years ago about the danger of such a state of affairs arising and a project was furnished for reorganizing the Parmatghat sewage pumping station.

With the sewers in their present state it will not be possible to lay the foundations of a new pumping station except at great cost and some danger. An alternative method of dealing with the present state of affairs is therefore being worked out and the Board has promised to provide the necessary funds.

The proposals for utilizing the sewage on a farm in the Jajmau area which were completed some years ago have so far not found favour.

The drainage of Cawnpore has been complicated by a large increase in the population and in the areas which are being developed. The new settlement area, the industrial area and the city extension area cover many square miles and some method of dealing with this drainage must be devised. The Superintending Engineer visited Cawnpore, and after an examination, made certain recommendations

CAWNPORE—(*concld.*)

on the lines on which the Municipal Board, the Improvement Trust and the Cantonment authorities might co-operate in drainage extension and improvement works.

Proper use is not being made of the sewers in Cawnpore in that the house-owners are permitted to discharge foul water in the open street gutters where manholes exist on sewers capable of intercepting such discharges. Many such drains cause an appreciable flow in the surface drains and create both a smell and fly nuisance. The resolute application of by-laws would soon put stop to such state of affairs specially in the new areas which are being developed.

The drainage scheme for Old Cawnpore amounting to Rs.2·26 lakhs has been completed and will be presented to the Municipal Board shortly. The Executive Engineer gave assistance by advising on the measures required to prevent flooding during the rains in the Couperganj area and also carried out some work on behalf of the Police Department.

DEHRA DUN.

Water supply—Owing to the acute shortage of water in Dehra Dun the Municipal Board decided to tap the Bandal Nadi at a point about nine miles from Dehra Dun. This will enable the supply to the public to be increased to about 16 gallons per head per day if the existing Baldi supply which is so hard as to be almost unfit for domestic purposes, is not counted. The amount of the estimate is about 5·55 lakhs of rupees.

Contract documents have been prepared and tenders will be invited shortly.

This project does not take into consideration the existing distribution where the mains are too small to prevent private supply being afforded. The Executive Engineer estimates that a sum of about two lakhs of rupees will be required for this purpose which may be spread over a number of years as the demand for private connexions extends.

When the Bandal work is completed the board will derive its supply from four separate sources. The town is expanding so rapidly that the Bandal supply will soon be all absorbed and the board will act wisely if it investigates the proposals for Muttranwala springs which if properly harnessed should supplant much of the present supply as an abundant flow of pure and relatively soft water is available there, though pumping must be resorted to.

The boring which was undertaken from funds granted by the Board of Public Health to discover an alternative source of water supply for Dehra Dun was carried out to a depth of 600 feet. The board had made arrangements to carry this boring deeper but owing to an accident whereby the boring tool became fast in the boulder formation and parted from the steel wire cable, a further extension of this boring was not found possible.

At a depth of 80 feet below ground level a strong spring of water was discovered which rose to a height of 20 feet in the tube. Thereafter an impermeable strata was discovered overlying further beds of gravel and sand. But these lower beds did not contain much water even above the levels where clay streaks occurred. Water in some quantity was again discovered at about 300 feet depth. It was hoped that by boring to a sufficient depth an artesian supply would have been found. Owing to the accident mentioned above a new boring would have to be undertaken if a greater depth is to be reached. The board is now contemplating a systematic exploration of each water-bearing stratum bored through by perforating the casing pipe and conducting pumping tests.

The difficulty concerning a continuous supply from the Kolukhet springs which has been complained of for many years past was discovered to be due to the Rajpur supply which is tapped off the leading main to Dehra Dun. When the Rajpur hydrants were opened the pressure in Dehra Dun dropped so much that a negligible supply only was obtained. The reduction of the size of the pipe to the Rajpur reservoir has to a great extent done away with this fault without unduly reducing the Rajpur supply.

The board removed some lengths of pipe from the inlet end of the Baldi pipeline and cleared the incrustation which amounted to over 2 inches in depth in the head lengths of the leading mains. The removal of this incrustation has resulted in the original supply of 150 gallons per minute being restored.

Complaints regarding the purity of the Kolukhet supply have been received and are receiving the attention of the board.

Owing to the efforts of the Chairman and the Vice-Chairman the grievous shortage which usually takes place in the dry months has been considerably alleviated. The Dehra Dun public are indebted to these gentlemen for many years' unselfish labour on behalf of the taxpayers.

Drainage.—Proposals for the Lakhi Bagh drainage are under consideration of the Municipal Board. The Board of Public Health before sanctioning the project required certain information concerning the ownership of the roads which have to be taken up, and this has since been furnished.

A project for extending the sewage farms has been sanctioned and a loan has been granted. Tenders have been invited for this work.

DEHRA DU N—(concld.).

Drainage—Tenders were called for and recommendations made as to letting the contract for the drainage of this notified area and the work will be started as soon as the committee approve of the letting of the contract.

DEORIA (DISTRICT GORAKHPUR).

Water Supply—This work has been satisfactorily completed and taken over from the contractors. The question of handing it over to the Mela Committee is under consideration. This body is being urged to employ properly qualified and experienced staff. The usual water supply to the *mela* held in October last was arranged and a copious supply of pure water was made available to the public attending this *mela*.

DEWA FAIR (DISTRICT BARA BANKI).

The question of making the water supply permanent for the town has been raised.

The board has deposited fees so that a project may be prepared for a water supply to the town.

ETAWAH.

The levelling and the surveying of the town has been completed and the Executive Engineer has investigated two alternative sources of supply, viz., one from the canal and the other from tube-wells. The canal supply proved to be much more expensive than that from tube wells owing to the necessity for filtration plant and the storage required during closures of the canal.

Water supply—It is a serious matter that the committee have so far not seen their way to supplement the existing set by a proper standby. An accident might very well interrupt the public supply at Fatehpur-Sikri for many weeks. A sum of Rs.13,000 only would be required for the extra plant.

FATEHPUR-SIKRI (DISTRICT AGRA

Tests for waste show that an insignificant amount of water is wasted and that the bulk of this is through leaky standposts. There are only three private connexions all of which are metered and this no doubt explains why the amount of water wasted at Fatehpur-Sikri is so small.

The hours of supply are very limited and unnecessarily so, for the storage available is sufficient to enable the pumping hours to be considerably extended if the supply is not made continuous. The present short intervals of supply create an artificially high demand which would be evened out if a continuous supply was made available.

The plant has been maintained generally in a satisfactory manner but the superintendent complains that he has no trained assistant or anyone whom he can rely on to work the plant in his absence. The superintendent also looks after the pipeline and distribution.

At the present time there is no provision for affording water for fire extinguishing purposes and the Mechnical Engineer's advice regarding this important matter should receive attention.

The occasional unsatisfactory bacteriological analysis of the water would appear to be due to samples which have not been collected aseptically. Full instructions have been issued from the Provincial Hygiene Institute relating to the methods to be adopted and since this has been acted upon, the results have been satisfactory.

There is an apparent loss of Rs.1,553 per annum in this supply. The arrears of collection amounted to about Rs.52·63 per cent. of the total demand. It would appear that the water supply rules are not being applied, for the water works at Fatehpur-Sikri can easily be made self-supporting and no valid reason exists for the deficits which is shown in the account.

The cost of water worked out at 4·37 annas per 1,000 gallons whereas the revenue realized amounted only to 2·70 annas per 1,000 gallons.

No adequate return from metered consumers is recorded although 90·7 thousand gallons were supplied. Under the rules a sum of 12 annas per 1,000 gallons should have been recovered for this supply.

FYZABAD

Water supply—Since the inauguration of the water supply in 1925 the number of unmetered connexions has risen from 589 to 1,425 but the number of metered connexions has increased during the same period only from 20 to 50. If the difficulty encoutered in maintaining the supply is considered, this state of affairs is eminently unsatisfactory. The board has been urged to meter all new connexions.

There is no doubt, but that waste and misuse of water is widespread. During one inspection out of 44 houses examined 33 were found possessing wasting connexions and the permanent waste amounted to 50 per cent. of the total available capacity of the plant.

The Mechanical Engineer for Water Works advised the staff concerned how to operate the pumping plant in a more efficient manner and his advice should be strictly followed.

The pumping plant at the main station operates unsatisfactorily owing to the meagre supply from the tube-wells. The capacity of the pumps is a great deal more than that which the wells can yield in the summer months and the pumps tend to run unevenly. This defect is apparent from the venturi diagrams.

Of the original tube-wells, no. 3 has shown the greatest decrease in output and it was decided to construct another tube-well to replace it. This well has been successfully completed and on test gave a continuous supply of 320 gallons per minute under a depression of about 25 feet. Tender forms are under preparation for the necessary air lift plant and appurtenances so that this new well may be made to deliver into the existing well and be pumped by the original plant into the distribution.

Generally speaking the pumping plant was maintained in a satisfactory order and the superintendent, water works, deserves credit for the manner in which he looks after it.

A profit of Rs.586 was made during the year under review, but it does not appear that the rents for the buildings let under the service reservoir are credited to the water works.

The cost of water during the year under review worked out at 3·86 annas per thousand gallons, whereas the rates for water supplied through meter amounted to only 2·93 annas per thousand gallons. The returns realized for metered water are too low and could be increased.

There are indications to show that the board does not apply the general water supply rules and does not proceed fearlessly against those who abuse the supply.

Proposals for extending the distribution mains to some mohallas not yet served have been prepared at the instance of the municipal board who consider that the revenue derived from these extensions will cover the cost of the extension.

GHAZIPUR.

Water supply—A boring was started in 1933 and carried down to a depth of 350 feet and a suitable strata for a strainer well was found. The tube-well, on testing, afforded 400 gallons per minute with a depression head of 16 feet. This being found sufficient to inaugurate a public water supply at Ghazipur, the final project was presented to the board who have sanctioned an amount of Rs.4·17 lakhs for a water supply to the municipality. The first working instalment of this scheme is estimated to cost 1·82 lakhs. This instalment will afford a supply of 12·5 gallons per head per day to a population of ten thousand souls.

Tender forms are under preparation.

GOLA GOKARNNATH.

Water supply—The supply from this water works in now only used for domestic consumption, the sacred tank being filled from the canal.

The district board starved the water works of the necessary funds for maintenance. No amount is credited to the water works for the cost of water supplied to the pilgrims nor indeed has the board taken steps to provide a sufficient number of standposts and tanks to meet the pilgrims' demands. The board also failed to provide the small sum of Rs.1,200 necessary for improving the tube-well.

The plant has been very well maintained by the superintendent and provided it receives the same attention as at present and proper fuel and lubricating oil is used, it should serve for many years to come. The district board derived a profit of Rs.2,238 for water supplied to the pilgrim melas held during the year. Valid excuse therefore does not exist for not carrying out some of the most urgently required repairs and for the persistent starvation of this supply as regards vital items in maintenance.

The Board of Public Health authorized a forecast of cost being framed for improving the drainage and water supply at Gola for pilgrims and this work is at present under consideration.

GORAKHPUR.

Drainage—An extension of the work of lining Kwadia Ramgarh storm channel, the first instalment of which was completed in 1933, was advertised and the contract placed. In this work is included some other drainage work required by the municipality, consequent on the improvements effected in the original work.

HAPUR.

Water supply—A forecast of cost for a public water supply to Hapur amounting to Rs. 2·24 lakhs was presented to the municipal board and this is being considered by them.

HARDOI.

Drainage—The forecast of cost amounting to 0·73 lakhs for improvements to the drainage of the town was approved, the Board of Public Health agreeing to assist this work by means of grant-in-aid. The detailed project is now in hand.

HARDWAR.

Water supply—Except in the case of no. 2 set the plant has been maintained in satisfactory order but the lighting and auxiliary wiring is not in a first class condition. The iron work inside the Tibri reservoir requires painting. The yields of wells no. 2 and 3 have fallen considerably below that of the capacity of the pumping plant and steps to clean the wells are being taken. The method of running the

HARDWAR—(*concld.*)

pumping plant with throttled delivery valves should cease as this entails much heavier power consumption. If mechanical engineer's advice is followed a saving of from 1·2 to 1·6 units per water horse power hour should be made.

Arrangements are being made for chlorinating the supply and at the same time to provide meters so that the total supply may be measured before delivery into the reservoir.

A project amounting to Rs.17,000 for providing an automatic chlorine apparatus with bulk meters and the necessary alterations to the delivery mains to the Tibri reservoir was prepared. The Board of Public Health have found half the cost of this work and the municipal board will find the balance. Tenders are being invited for the ammonia chlorine process.

Vigorous waste prevention measures were undertaken by this board on the recommendation of the Mechanical Engineer and in the space of a few months a marked reduction in waste took place. A continuous supply is now contemplated.

In this municipality the recommendations of inspecting officers are attended to with beneficial results and delays in answering correspondence do not take place.

A fourth tube-well was constructed on municipal grounds near the Mayapur dam. This boring was carried down through hard boulders and stiff clay. An yield of 320 gallons per minute with a depression head of 30 feet was obtained.

The building work is well advanced and the pumping plant for this extension has arrived and will shortly be erected. This work, when complete, should enable the water supply to Hardwar to be doubled.

Electric Supply—The electric equipment was generally in good order but one of the transformers has been removed to another part of the system from its sub-station, this should be replaced early and it will also be necessary to find standby transformers now as the load develops.

The advisability of more adequately staffing the system has been brought to the notice of the board.

Drainage—The drainage of Hardwar has been a controversial question for many years past and now that the Hindu Sabha has agreed to the proposals, the scheme is being proceeded with. The original project which was brought up to date in 1927 has had to be re-drawn in several particulars owing to developments which had taken place in the meantime. The main change has been brought about by the fact that the Ganges canal now has no closure period. Since the inauguration of the Hydro-Electric Supply, the Ganges canal must be kept running to its full supply level continuously throughout the year. The original proposal then to gravitate all the sewage under the canal and a main sewer which ran parallel to the canal for several miles and under the bed level of the canal now proves to be a much more expensive procedure than originally estimated. Investigations have shown that it will now be cheaper to provide a sewage pumping station on the right bank of the canal and pump the sewage across the bridge. The project has been completed and presented to the board.

One of the conditions on which the Hindu Sabha agreed to this drainage proposal was that no sewage should be discharged into the Ganges. For this purpose a sewage farm with scope for treating the sewage in certain seasons and in all conditions of weather has been found necessary. This work will form part of the revised project.

Har-ki-pairi improvements—A reinforced concrete bridge connecting the island platform with the Jammu steps was prepared. An arched rib bridge 65 feet span and 8 feet rise was constructed, the money having been found through the benevolence of a Hindu gentleman. Some additional drainage was provided in the vicinity of the infectious diseases hospital which was completed the previous year.

Town Planning of Bhopatwala—The Executive Engineer advised the board concerning encroachment in the bed of the Bagh Rao which might result in damage and loss of life.

Further building operations were prohibited and the Executive Engineer drew out plans defining the beds, indicating the flanking bunds required and allowing for a bridge across the Rao over the Hardwar-Rishikesh Road. This project is being considered by the municipal board.

HATHRAS.

Water supply—This supply was satisfactorily completed and tested. The opening ceremony was performed on 14th March, 1935 by His Excellency the Governor. Private supply has been refused until such time as the new rules sanctioned by the Government are put into force by the board. The supply at Hathras is obtained from five tube wells sunk in very difficult strata and the board would do well to diligently conserve their supply as the provision of more wells will be a costly and difficult matter.

HATHRAS—(*concld.*)

The high tension feeder line for the supply of power for which the board have agreed to defray the cost has not yet been completed by the supply company. The low tension supply is unsatisfactory. The board have determined to proceed with drainage works and investigations are proceeding.

HALDWANI.

Water supply—This supply is obtained from surface springs. About 6 per cent. of supply is afforded to the railway free of cost. Nearly 60 per cent. of the supply is wasted and the board should take energetic steps to deal with the state of affairs.

The board would be well advised to impose a water tax in order to make the water works self-supporting as it is now being starved of essential maintenance work.

JAUNPUR.

Water supply—The first instalment of this water supply is estimated to cost 1·73 lakhs. The work has been let in four contracts. The distribution system together with the storage tanks and balancing tanks and the filtration plant buildings are nearly ready. The work on the pumping plant and filtration plant has been held up owing to the decision of the board to approve of the licence to a private company for a public electric supply in addition to a power supply for water works pumping.

Drainage—The original drainage works completed in 1910 and subsequently extended in 1913 have suffered owing to lack of flushing arrangements.

At the request of the municipal board the Executive Engineer is arranging to provide proper flushing tanks in connexion with the water supply which will shortly be available.

There are several extensions to the drainage also which are under consideration.

JHANSI.

Water supply—The present plant, if worked for twenty-four hours daily, could afford to supply about ten gallons per head per day to the population. The plant is eighteen years old and very uneconomical and the time has now come when it should be replaced by more up-to-date machinery. The Mechanical Engineer estimates that if the present plant was scrapped and an efficient and up-to-date modern plant installed, the existing annual charges including sinking fund and interest could be reduced from Rs.19,400 to Rs.14,700.

Owing to the unwillingness of the board to purchase for a small sum the necessary apparatus for testing, the monthly tests in the pumping plant have not been untertaken.

The board has reduced the pay of their staff and a certain discontentment has resulted. Staff quarters are reported to be in a disgraceful state of repairs and unfit for habitation.

Although many recommendations have been made, the board have so far not attempted to run any night tests to make sure that a large portion of the water pumped is not wasted.

The 9″ rising main is often thrown out of service owing to leaks and it is possible that a great deal of invisible waste takes place through the joints in these pipelines.

The Board does not seem to maintain a proper stock of coal fuel. A much larger quantity is said to be used than the out-put justifies and coal of an inferior nature is purchased from several sources. Generally this water works is in a very unsatisfactory state.

The Executive Engineer on behalf of the municipal board is constructing a service reservoir estimated to cost Rs.45,000. The work on this has been slow owing to the fact that foundations of the reservoir have to be laid on granite which cannot be blasted owing to the proximity of dwellings and which has to be dressed by other means.

Drainage—The Board of Public Health have given a grant to this municipality amounting to Rs.5,000 to enable it to have a proper survey of the town made with a view to extensive improvements in the drainage.

KANAUJ.

Drainage—An inspection of Kanauj drainage works discloses the fact that the bullock driven chain bucket pump by means of which the sewage was raised to irrigate the farm had fallen into disuse and was completely out of repair. This municipality has agreed to reinstate this work for which it received a substantial grant-in-aid in 1930.

KASGANJ.

The board felt it could not finance proposals forecasted at 1·6 lakhs for an extensive drainage system and now desires merely to improve the existing outfall drains. A forecast of cost for this work with which it has been provided amounts to Rs.43,000.

KOSI.

Water supply—This has now become sufficiently important for a more careful account to be kept of the water pumped. The installation of a meter on the rising

main at the pumping station should no longer be delayed. There are signs that the hours of pumping are unduly restricted and steps are now overdue whereby a standby set should be provided in another well in case the maximum hourly demand cannot be met by the present set. KOSI—(*concld.*)

Owing to the wise policy adopted by the committee on insisting on all private connexions being metered, the waste in this supply is perhaps the least in the Province.

The 2½ inch fire hydrant at the municipal office which is being used for watering the municipal garden is a source of waste and should be attended to. A storage tank with a float valve if erected here would ensure that excessive quantities of water are not drawn off.

An experienced engine fitter and driver is required to assist the driver in-charge of the pumping station and he should be one who is capable of undertaking repairs to the machinery and fitting all parts under the instructions of the driver. Such a person could also act as pipeline inspector. The board has appointed an inexperienced, though academically qualified officer as Water works Superintendent against advice.

Drainage—An estimate for improving the drainage amounting to Rs.0·69 lakhs and an estimate for a sewage farm were presented to the board who are at present considering them.

Water supply—Little change has taken place in the condition of the water-supply except that many additional connexions have been granted. The cantonments have now a separate water supply. This renders at least 300,000 gallons of water extra available for distribution in the municipal area, but in spite of this there does not seem to be any appreciable improvement owing to the wasteful flow. LUCKNOW.

Reports show that the existing plant is incapable of meeting the demand and the board is thus unable to meet its responsibilities under the Act. It has been pointed out many times that there can be no hope of improvement unless waste is dealt with in a rational manner. Indeed no scheme of extensions is justified until the waste question has been satisfactorily dealt with.

Nightly tests show that 350,000 gallons per hour is absorbed by the distribution between 1 and 2.30 a.m. Such an enormous flow would be impossible if the distribution system was satisfactory. During this test which took place during the coldest weather, the cantonments and the railway mains were closed.

It seems safe to say that over 70 per cent. of the present supply is not put to any useful purpose and the loss to the Lucknow tax-payer may be gauged from the fact that his water supply costs him Rs.5·5 lakhs each year.

During the night tests house to house inspections were carried out and the large number of private connections which were found to run continuously, explains how the water is being lost.

It should be reckoned to the credit of this board that it is investigating this serious question and has already devoted expenditure to the purpose of waste prevention. It is hoped that it will not be deterred by the opposition of a few and that it will see that its duly appointed officers apply the rules without fear or favour, then we shall hear less concerning the inadequacy of the plant and shortage of supply in a few months' time.

The board would be wise to increase the hours of pumping with the object of giving a continuous supply as soon as the wasteful flow has been reduced to within reasonable limits. Tests were carried out which showed that this should easily be possible without any extra plant if they are in earnest about the waste prevention.

During the last five years a profit of over 1·23 lakhs per annum was derived from this water works undertaking and these results show that not only is a continuous supply possible but some reduction in water rates should also be possible and are indeed imperative if section 129(*b*) of the Municipalities Act is not to be infringed.

Encroachments over supply mains and bursts of mains have caused some loss to this undertaking.

Drainage—Efforts to economize in sewage pumping whereby the sewage is allowed to pond up for miles in mains and branch sewers have resulted in deposit taking place in the sewers and in the storm relief overflows operating in such a manner as to fill the storm channels with crude sewage. This has many times been the subject of adverse reports. Not only has this process resulted in a nuisance in the inhabited areas but the flow from the storm channels results in great contamination of the Goomti.

The main western intercepting sewer has been breached in several places and the sewage overflows from this sewer into the Goomti and adds considerably to the

LUCKNOW (*contd.*) nuisance. During times of melas when the river is used for bathing purposes, this has become a serious menace to the health of the public.

Reports show that sufficient advantage is not being taken of the sewage farm and that large areas still remain unirrigated, whilst large volumes of the sewage are allowed to flow back into the river from the sewage farm.

The additional areas which have recently been developed have been inadequately drained in places where sewers have been provided. These sewers have not been properly connected to the main drainage system but have been made to discharge into the open storm channels thereby defeating the purpose of the system and increasing the danger to health, and the smell and fly nuisance so often complained of.

Departmental Anti-malarial Works—During the year the repairs to the Goomti weir were carried out and the weekly flushing arrangements to prevent the breeding of mosquito larvae were regularly effected. The Ghaziuddin Hyder canal lining was also satisfactorily maintained and inlets to the foul water sewer were constructed on behalf of the municipal board and other local authorities. Several small items of drainage works in connexion with government buildings were also undertaken by the Executive Engineer.

MEERUT. *Water supply*—No serious consideration or action has been taken on the various inspection reports of this supply.

The water works is unable to meet the demand during hot months. The hours of supply are curtailed whereby a large portion of the public receive an inadequate supply and many receive no supply at all whilst those living in low lying areas receive almost a continuous supply.

As regards the waste, the tests carried out at the height of cold weather when rain was threatening show that 18,000 gallons per hour is allowed to run wastefully into the street drains; this constitutes over 30 per cent. of the output of the Bhola station, during this test many consumers were found to have defective fittings or to leave their taps open continuously. The board seems incapable of applying the general rules and regulations of the water works and still permits unmetered private connexions.

The method of dosing the crude water with alum is ineffective and the Executive Engineer has advised the board concerning this. The filters of this station also require to be provided with automatic controls.

Great opposition to the alteration and improvement of the water supply rules was encountered. The board has not succeeded in metering those private connexions on the rising main which enjoy a twenty-four hours supply much to the detriment of other consumers. These connexions 75 in number have been found to absorb 17,000 gallons daily before the water can reach other consumers.

The proposals prepared by the Executive Engineer for improving the water supply to the civil lines have also not received consideration.

The balancing tanks at the tahsil are inadequate in the present circumstances.

The waste prevention measures are not popular though it has been proved that less than 60 per cent. of the water which is pumped into Meerut is put to use.

The board steadfastly refused the appointment of an extra pipeline inspector which inspecting officers have recommended for some years past as indispensable if those heavy losses which the board at present suffer are to be avoided.

The developments which have taken place to the Bhola falls in connection with the hydro-electric grid caused the water level in the tail race to rise above its original level and much trouble is experienced in dewatering the turbine wells. Bunds have to be constructed and water pumped out from these wells to examine and adjust the turbines.

The shortage of water has been so acute that some institutions such as the Meerut College are considering the advisability of constructing their own private supply.

A forecast of cost for improving the water supply to Meerut Jail was also prepared.

No drainage developments of any consequence took place during the year.

MIRZAPUR. *Water supply*—This town depends for its water supply on an impounding reservoir which has been constructed to hold three years' supply in order to tide over a possible sequence of dry years.

For many years past the board have been urged to use the instruments which were originally provided to measure the rate at which water is drawn off from this reservoir and its total quantity so that in the event of the impounding reservoir being unduly depleted steps might be taken in time to assure a supply to the public.

MIRZAPUR—(concld.)

As long ago as 1923 the question of setting to work the venturi meter and its recording apparatus was raised by inspecting officers. Although twelve years have elapsed this board has not yet succeeded in obtaining any records of the total quantity or the rate of consumption. In the event of it now being too late to take any effective steps to guard against the depletion of the reservoir and therefore against a failure of the supply, the municipal board itself must shoulder full responsibility.

The chairman reports that the tax superintendent and all his clerks are so busy in preparing the registers required under the revised water rates that he cannot submit the necessary statements of demands and collection or of consumption and revenue.

Night tests indicate that nearly seventy per cent. of the average hourly flow is continually run to waste. The bulk meter originally provided for the supply is inadequate to measure the tremendous flow which takes place at night. The 900 original meters provided have now dwindled to 10 and the advice given by inspecting officers falls on deaf ears.

The water analyses have shown unsatisfactory results for some time and the executive engineer is advising the board as to the provision of suitable filtration and chlorination plant.

MOGHALSARAI.

Water supply—Of the two alternative forecasts of a water supply the Notified Area Committee has chosen the costlier one so as to enable private connections to be given. In the meantime they have been furnished with an estimate for a tube-well so that the available supply may be tested and the detailed project put in hand.

MUSSOORIE.

Hydro-electric supply—Owing to the pelton wheel buckets and other parts of the turbines being damaged by the silt carried down the pipelines to the Galogi power station, the voltage and the frequency of the supply is subjected to considerable variations. The Electricity Act is thus being infringed and serious complaints have been received from the public. In spite of this the board have delayed to take steps on the estimates and recommendations of their electrical engineer.

Thanks to the diesel station at Kaulagarh serious interruptions in the supply have been avoided.

The maintenance of the buildings and quarters is unsatisfactory and steps to deal with this have been recommended by the electrical engineer.

The undertaking seems to be under-staffed in several important aspects and this remark applies to the accounts department particularly.

It is proposed to concentrate the municipal offices at Dehra Dun and in this manner avoid some duplicating of the staff at headquarters.

The working of the municipal accounts with the double accounts system now in vogue is not to be recommended. More interest is required in the fostering of the sale of electric energy. Much more revenue could be derived if attention was given to this important activity.

A great deal of loss is suffered by the board owing to the faulty meter system and unsatisfactory distribution.

The board on occasions appear to doubt their ability to manage the scheme and it appears that several offers from private concerns for taking over this supply have been received.

The third power pipeline has been succesefully completed and brought into operation and the sedimentation tanks over which the city tax-payers suffered heavy loss have now been reinstated and made to function properly owing to the change made in the staff responsible for their construction and upkeep.

These sedimentation tanks function in a very efficient manner thereby proving that advice given by the Executive Engineer in their design and layout has been of great value. The electrical engineer when completing the third new power pipe line connected it with the sedimentation tanks, obtaining a greater head on the pelton wheels which will save much water in dry seasons.

The cost of this work was materially reduced by the arrangement which the electrical engineer made to carry the pipes to a point on the motor road above the alignment and transport them by means of a special aerial cable way to site.

Considered generally, the hydro-electric supply is not in a satisfactory condition, the board do not give the advice of inspecting officers or even of their own duly appointed officers proper consideration and are apt to criticize technical matters beyond their competency and delay inordinately to take measures to properly maintain and extend the supply to meet public requirement—though such extension offers more scope for profit.

The time has now come when the additional diesel set cannot be delayed without danger and it is estimated that this work in addition to the other urgent programme of items will necessitate the board taking a substantial loan.

MUSSOORIE—(*concluded*).

Water supply—The electrical engineer by energetic action as soon as the distribution was put into his charge succeeded in saving 30 per cent. the usual quantity of water pumped during the year and the electric energy required for this wasteful demand was made available for sale. Many leaks discovered during tests were repaired. The board must have lost a sum of Rs.30,000 owing to this neglect each year.

Whilst excavating the foundations for a new hospital a spring was discovered on a dry hill-side where it was never expected that water could be found. The quantity was such that it was thought profitable to pump it into one of the reservoirs. The investigations did not proceed far until the electrical engineer pointed out that this water was due to leaks in the rising main.

Drainage—The complaint from the Toneta villagers in Tehri Garhwal State, concerning the discharge of offal from the slaughter house into the ravine close to the village has now been overcome by treating the discharge at a point close under the slaughter house site. This process has rendered unnecessary a costly scheme for piping the sewage several thousand feet down the hill-site to a new sewage farm site.

Little use has been made of the sewers in the Happy Valley area, the board have not taken steps to get the property owners to connect their premises.

MUITRA

Water works—During the year this undertaking showed a profit of Rs.11,300. The total cost of water per thousand gallons including sinking fund and interest charges amounts to 4·17 annas.

There has been a steady improvement in the collection of bills in this municipality the percentage of arrears having been continuously reduced from 16·4 in 1931 to 9·77 in 1933-34.

The extension of the hours of supply and more vigorous attention to waste prevention would result in a very great improvement in the supply to this municipality.

The cost of pumping from the old diesel sets is less than one-quarter that of the electrically driven plant but owing to the agreement which the board entered into with the supply company they are prevented from using the diesel plant for purposes of pumping. On the expiry of the agreement the board will be justified in demanding a substantial reduction in the rates for power for pumping.

The existing plant is quite sufficient to supply the total legitimate demand of the town but as said before, an extension of the hours of supply and larger balancing capacity is necessary.

The affording of a continuous supply will automatically do away with lack of pressure in the high zone if it is combined with proper waste prevention measures and this will in itself save the board a considerable sum in the capital required for the boosting and zoning work and the recurring charges involved therein.

The forecast of cost for work entailed in dividing the distribution into high and low zones was not recommended by the Superintending Engineer, who was of opinion that there was a copious supply and plenty of pressure, provided the board took steps to reduce waste and increase the pumping hours so that the supply become continuous.

Leakage and waste which cannot be accounted for amounts to over forty-five thousand gallons per hour and judging from the results of house-to-house inspections much of this is due to leaky fittings or to the neglect of consumers to shut off their taps.

The maintenance of the pumping plant and the undertaking generally was better than the average in the province but the board invites trouble by refusing to appoint an assistant to their waterworks superintendent; the latter being the only qualified hand on the water works staff.

Drainage—The Executive Engineer inspected the system and drew the board's attention to certain defects which required attention.

The sewage farm continues to do well and keen competition takes place each year when the plots are put to public auction; the board derives a substantial profit from this farm.

The dispensary block of the infectious diseases hospital is to be re-built and fencing and drainage provided.

MUZAFFARNAGAR.

Drainage—Though the board has deposited the necessary fees to enable a project to be drawn out for drainage improvements yet owing to shortage of staff the Executive Engineer has not been able to put this work in hand. Similarly the completion of the New Mandi drainage work has been held up though the board has agreed to the stipulations of the Board of Public Health as to prevention of encroachments.

Hydro-electric supply—The bazar wiring at Naini Tal has been renewed, but since money was not available armoured steel conduit could not be provided. It is hoped the board will be able to put the Talli Tal bazar work in hand soon. NAINI TAL.

An improvement at the power station has been made by putting the feeders to Naini Tal and Patwadangar lines on separate H. T. oil switches. Now lightning arresters have been provided. Number II set has been provided with new bearings.

Though offers to meet the cost have been made, the board is not prepared to take the necessary loan for an extension of the supply to Bhowali.

The staff which the board regularly appoint are unqualified and a great deal of trouble and loss which occurs on the maintenance is due to this cause.

Water supply—The lake-side pumping plant is being overhauled and both pumps have now been provided with gauges on the suction arms. The overhauling work to the rising mains and other plant has been carried out in the usual manner. Some replacements and renewals have been effected also. Steps should be taken as soon as funds are available to realign the rising main to Tonnochy reservoir where it passes under the foundations of out-houses and is therefore inaccessible.

The mechanical engineer is considering a water supply softening plant for this municipality as complaints regarding the hardness of water are increasing.

Water supply—Although this town has been fortunate in obtaining an artesian supply from the tube-wells constructed some time ago, yet it has made no effort to harness this well with a view to providing the town area with a public supply of water although the capital involved amounts to only Rs.6,800. NAUTANWA (DISTRICT GORAKHPUR).

Water supply—At the request of the municipal board, Orai, the Executive Engineer prepared a forecast of cost for a water supply to Orai. It is estimated that a sum of about Rs.86,000 will be required. Steps are being taken to put in hand the trial boring. ORAI (DISTRICT JALAUN).

Water supply—Great hardship to the inhabitants of this municipality took place owing to the surface wells in the town drying up during the summer of 1933. The executive engineer provided a forecast of cost amounting to 0·70 lakhs for a public water supply to the town and advised the Board to make arrangements to get a trial tube-well constructed before proceeding with the detailed project. PARTABGARH.

Drainage—Though the Board of Public Health have promised to contribute Rs.50,000 towards the construction of the main drains of this town and though a sanctioned project exists the municipal board have not taken any action to effect these improvements in spite of the insanitary conditions of the town. SAHARANPUR.

Water supply improvement—The municipal board were provided with a forecast of cost amounting to 0·32 lakhs for a public water supply from tube wells. So far they do not seem to have come to any decision on these proposals. SANDILA.

Drainage—A forecast of cost for improving the town is in hand. In addition to this, proposals for water supply to enable the dust nuisance to be abated in this municipality were also prepared by the Executive Engineer. SULTANPUR.

Water supply—It is essential that a bulk meter be provided on the rising main from the water works to the service reservoir as certain discrepancies have been noticed in the pumping hours and in the quantity delivered which it is difficult to explain. UNAO.

A large number of standposts which are reported to be repaired periodically show that either the repairs are not being carried out satisfactorily or that inferior material is being used. Eighty-three standposts were reported to have been repaired in one quarter when 65 exist in all.

It is highly desirable that the supply at Unao be extended and made continuous. This will entail steps long overdue to control waste and perhaps the addition of some extra storage capacity in the service reservoir. The board erroneously argue that the shortage which takes place in certain parts of the area, particularly in the civil lines and other distant places from the water works is due to lack of water, whilst the shortage is really due to waste in areas where the pressure is high and the hours of supply longest.

In spite of the shortage of water the board has allowed three very large unmetered connexions for non-domestic purposes. These connexions themselves would account for an appreciable amount of the total water supplied.

Though a number of suitably disposed fire hydrants were provided in the original work, the municipal board does not maintain any fire hose or other fire extinguishing appliances.

There is evidence everywhere of a great amount of waste. The majority of the standposts are in a leaky state. No organized waste prevention measures are carried out. A night test carried out under the supervision of officers of this department showed that during the cold and rainy weather 27 per cent. of the total pumping capacity was absorbed between midnight and 3.15 a.m

UNAO (*concluded*). During the period of this test a house-to-house inspection was carried out and out of 50 houses inspected 25 were found to be wasting water in large quantities.

The board for one reason or another has failed to use the many meters which were purchased several years ago. The revised water works rules have recently been sanctioned by government and now no excuse remains for the board to delay in applying these meters.

The wells continue to afford a satisfactory supply but the plant requires a regular and thorough overhauling.

The Mechanical Engineer made certain recommendations as regards economy in the staff employed.

The board has neglected to obtain the requisite approval for the appointments of several of their staff requiring technical qualifications.

The drainage pumping station was maintained in fair order but the staff employed has not been satisfactory. The board have been advised concerning this.

Drainage—The board are being advised as regards extending their drainage to Stevensonganj.

STAFF

Mr. F. D. Tunnicliffe, M C, continued to officiate in the post of Superintending Engineer, up to 3rd October, 1934, when the permanent incumbent Mr. G. McC. Hoey, returned from leave and took over charge of the post which he held for the remainder of the year. The post of Personal Assistant was held by Mr. K. Chattopadhya until 11th October, 1934, and again from 21st January, 1935, for the rest of the year; Mr. H. G. Trivedi held the post of Personal Assistant during the intervening period.

Mr. W. Saise continued as Executive Engineer, I Division, Public Health Department, Meerut, throughout the year.

Mr. F. D. Tunnicliffe held the office of Executive Engineer, II Division, Public Health Department, Allahabad, from 9th October, 1931, up to 24th January, 1935, when he proceeded on leave out of India and handed over charge to Mr. H. G. Trivedi who continued to officiate for the remainder of the year.

Mr. N. D. Chowdhury continued as Executive Engineer, Well Boring Operations Division, Cawnpore, throughout the year.

Mr. C. W. Casse' held the post of the Mechanical Engineer for Water Works throughout the year.

The post of Mr. G. K. Pillai, Executive Engineer, attached to II Division, Public Health Department, was retrenched from 1st July, 1934. Also the post of one assistant engineer, was abolished with effect from 5th February, 1935.

In addition to the above three permanent assistant engineers, and four temporary assistant engineers, with one temporary assistant engineer for the Allahabad District, Public Works Department work, 9 overseers, 10 temporary subordinates and the requisite number of computors, draftsmen and clerks were employed.

It is with profound regret that I record the death of Captain Walter Saise under tragic circumstances in Quetta during the earthquake. This officer's work on many occasions has received laudatory notice and thanks from the local authorities for whom he laboured. Not only has the Department lost an officer respected and liked by all who came in contact with him, but an officer of high qualifications and great experience whose place cannot be filled.

Captain Saise was deputed for a few weeks to the Baluchistan administration to give advice on matters of water supply and drainage, a work for which his knowledge and experience well fitted him.

The staff of this Department rendered assistance to Thomason Civil Engineering College, Roorkee, and the Lucknow University as examiners and lecturers in engineering subjects. The Superintending Engineer has been appointed by Government to serve on the Advisory Council of the Thomason Civil Engineering College as the accredited representative of the Institution of Civil Engineers.

G. McC. HOEY,

Superintending Engineer.

15*th July*, 1935.

APPENDICES.

APPEN

Statement of operations of various water works

Item number	Particulars	Agra	Allahabad	Benares	Cawnpore	Lucknow	Meerut	Mussoorie	Naini Tal
	Population								
1	By census of 1931 in municipality.	265,487	173,895	201,037	219,189	251,097	91,181	11,040	13,558
2	By census of 1931 in cantonments.	24,277	10,019	4,278	24,566	23,562	45,528	2,017	1,233
3	Inhabitants drawing their supply from mains.	229,764	183,914	205,315	243,755	218,000	91,181	13,057	14,791
	Annual Consumption of water								
4	Metered supplies—								
	(a) Cantonments, million gallons.	171·091	72·342	0·935	5·525	61·840	Nil	5·810	3·090
	(b) Trade, million gallons ..	58·292	28·749	3·004	319·905	141·479	13·176	Nil	0·146
	(c) Domestic (bungalows, etc.) million gallons.	100·843	30·324	34·972	435·239	122·255	3·415	46·601	17·531
	(d) Buildings, million gallons..	2·598	9·186	65·844	65·768	14·095	0·064	..	0·197
	Total Metered supplies, million gallons.	332·824	140·601	104·755	826·437	339·669	16·655	52·411	20·964
5	Unmetered supplies—								
	(a) Domestic (assessment or ferrule), million gallons.	786·643	893·436	1,876·811	1,667·345	1,494·150	319·529	10·809	24·938
	(b) Standposts, million gallons	219·326	389·927	469·203	260·208	965·375	199·729	43·235	11·311
	(c) Buildings, million gallons..	2·117	13·518	5·166	36·114	0·379	..	3·603	0·065
	(d) Municipal purposes (road watering, irrigation and flushing, etc.), million gallons.	175·950	628·098	167·942	372·266	477·957	3·326	14·412	9·897
	Total Unmetered supplies, million gallons.	1,184·036	1,924·979	2,519·122	2,335·933	2,877·861	522·583	72·059	46·206
6	Total quantity supplied during the year (items 4 and 5), million gallons.	1,516·860	2,065·580	2,623·877	3,162·370	3,217·530	539·238	(a)124·470	(b)67·170
7	Daily average supply, million gallons.	4·156	5·659	7·189	8·664	8·815	1·477	0·341	0·184
8	Maximum daily average in any one month, million gallons.	5·233	6·667	7·412	10·855	11·146	1·609	0·404	0·239
9	Maximum supply on any one day during the year, million gallons.	5·840	7·250	10·331	11·340	14·921	1·793	0·541	0·334
10	Consumption per head per day for trade alone, gallons.	0·70	0·43	0·04	3·59	1·78	0·40	..	0·03
11	Consumption per head per day for municipal purposes and buildings, gallons.	2·15	9·69	3·19	5·33	6·19	0·10	3·78	1·88
12	Consumption per head per day for domestic purposes, gallons.	15·24	20·65	31·78	26·62	32·47	15·70	22·34	10·53
13	Total consumption per head per day (items 10, 11 and 12), gallons.	18·09	30·77	35·01	35·54	40·44	16·20	26·12	13·44
14	Hours of daily supply ..	9·78	15·00	9·76	16·00	17·00	19·94	24·00	24·00
15	Total hours of pumping during the year.	8,973·83	14,848·63	8,477·77	14,796·00	12,210·40	7,278·50	11,060·42	5,186·75
	Lift of pumps								
16	From river to settling tanks, feet.	43·78	135·33	91·73	38·83	113·07	15·16	Murray 1,811·50 Mackinon 639·00 Bhilaru 1,335·03	L. Z. 262·35 I. Z. 461·85 II. Z. 1,170·34
17	From filtered water pumps to town distribution, feet.	131·72	110·21	94·76	94·00	86·29	125·22		
18	Total Lift, feet	175·45	245·54	186·49	132·83	199·36	140·38	Average 1,396·18	Average 527·51
19	Total water horse power hours during the year in million.	1·34	2·56	2·47	2·12	3·24	0·38	0·83	0·1

(a) Includes gravity supply 4·529 million gallons.
(b) Ditto 14·647 ditto.

DIX A

in the United Provinces for the year 1934–35

Dehra Dun	Jhansi	Mirzapur	Muttra	Fyzabad	Hardwar	Unao	Kosi	Fatehpur Sikri	Aligarh	Almora	Gola-gokaran-nath	Haldwani
40,409	64,591	61,184	60,590	59,992	33,287	16,282	7,294	6,998	89,878	8,715	5,164	11,288
9,721	12,121	Nil	3,430	5,726	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
40,409	40,255	42,700	59,441	35,000	11,535	13,000	7,294	6,152	35,000	8,715	5,164	11,288
Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
0·118	1·780	8·897	1·763	Nil	1·054	Nil	0·863	Nil	Nil	Nil	Nil	4·562
10·120	1·311	Nil	1·087	(c)11·357	0·794	2·909	0·760	0·091	Nil	Nil	0·239	Nil
*0·524	0·142	Nil	0·906	0·407	1·388	*2·140	Nil	Nil	Nil	Nil	Nil	Nil
10·762	3·233	8·897	3·756	11·764	3·236	5·049	1·623	0·091	Nil	Nil	0·239	4·562
99·238	3·902	189·467	110·380	89·064	53·680	50·175	Included in 5(b)	14·791	82·961	0·969	Nil	40·436
	64·352	89·360	194·576	79·787	40·072		21·679		17·094	32·124	3·555	35·846
	Nil	2·348	4·103	0·260	0·527	Nil	0·316		Nil	Nil	Nil	2·357
	3·810	54·740	21·332	15·018	4·564	Nil	0·158	Nil	2·831	Nil	Included in 5(b)	Nil
99·238	72·064	335·915	270·421	178·129	98·852	50·175	22·147	14·791	102·886	33·113	3·555	78·639
110·000	75·297	344·812	274·177	189·893	102·038	55·224	23·770	14·882	102·286	33·113	3·794	83·201
0·301	0·206	0·945	0·751	0·520	0·280	0·151	0·065	0·041	0·280	0·091	0·010	0·228
0·435	0·280	1·236	0·947	0·565	0·333	0·200	0·083	0·053	0·354	..	0·016	..
Nil	0·410	1·641	1·068	0·670	0·519	0·230	0·113	0·102	0·472	..	0·036	..
0·01	0·13	0·57	0·08	Nil	0·25	Nil	0·32	Nil	Nil	Nil	Nil	1·11
7·45	0·27	3·66	1·23	1·23	1·54	0·45	0·18	Nil	0·22	Nil	Nil	0·57
	4·73	17·89	11·34	13·65	22·46	11·19	8·43	6·63	7·79	10·41	2·01	18·51
7·46	5·12	22·12	12·64	14·86	24·25	11·64	8·93	6·63	8·01	10·41	2·01	20·19
24·00	10·23	16·86	7·70	8·25	14·00	10·00	10·00	6·66	8·89	24·00	3·72	24·00
Nil	3,736·25	Nil	3,862·17	12,288·47	9,565·00	3,681·63	3,145·50	2,840·00	11,361·75	..	1,261·25	..
Gravity supply.	220·73	Gravity supply.	D. C. set 143·10 A. C. set. 168·70 5th well 205·40	Old pump 109·61 New pump 133·07	176·00	125·33	111·16	206·07	147·05	Gravity supply	72·05	Gravity supply
Gravity supply	220·73	Gravity supply	Average 168·51	Average 121·42	176·00	125·33	111·16	206·07	147·05	Gravity supply	72·05	Gravity supply
..	0·08	..	0·23	0·12	0·09	0·03	0·01	0·02	0·07	..	0·001	..

* For municipal purposes.
(c) Includes 74,000 gallons supplied to post office in cantonment.

APPEN

Statement of operations of various water works

Item number	Particulars	Agra	Allahabad	Benares	Cawnpore	Lucknow	Meerut	Mussoorie	Naini Tal
	Supply connections								
	Unmetered—								
20	Number of connexions made during 1934-35.	159	32	449	570	698	75	3	Nil
21	Total number of connexions ..	5,771	7,430	17,345	11,871	13,587	2,050	27	7
	Metered—								
22	Number of house connexions made during 1934-35.	9	16	248	382	57	2	40	15
23	Total number of house connexions.	168	307	445	2,262	490	23	775	395
24	Number of trade connexions made during 1934-35.	8	Nil	5	3	16	Nil	Nil	1
25	Total number of trade connexions.	136	44	50	146	126	23	Nil	18
26	Total number of metered connexions (items 23 and 25).	304	351	495	2,408	616	46	775	413
	Annual charges and cost of water supplied.								
27	Maintenance charges. Rupees	1,44,002	2,76,530	2,44,765	3,45,633	4,01,554	35,157	(b)81,490	(c)52,624
28	Interest and sinking fund charges. „	62,486	1,39,056	88,090	34,522	1,47,645	Nil	41,125	25,589
29	Total charges. „	2,06,488	4,15,595	3,32,855	3,80,205	5,49,199	35,157	1,22,615	78,213
30	Cost per 1,000 gallons per 100 feet lift. Annas	1·24	1·31	1·09	1·45	1·37	0·74	1·13	3·53
31	Cost per 1,000 gallons maintenance charges „	1·52	2·14	1·49	1·75	2·00	1·04	10·47	12·53
32	Cost per 1,000 gallons interest and sinking fund charges. „	0·66	1·08	0·54	0·17	0·73	Nil	5·29	6·10
33	Total charges per 1,000 gallons (items 31 and 32). „	2·18	3·22	2·03	1·92	2·73	1·04	15·76	18·63
	Annual Income from water-works.								
34	Unmetered—								
	(a) Water-rate. Rupees	1,79,128	3,69,767	2,90,566	4,10,550	3,11,804	Nil	9,005	47,798
	(b) Ferrule rating. „		2,181		36,184	82,044	30,902	..	..
	(c) Buildings and other receipts. „	3,419	14,042	21,460	12,038	(a)35,914	415	1,421	1,833
	Total .. „	1,82,542	3,85,990	3,12,026	4,58,772	4,29,762	31,317	10,486	49,631
	(d) Municipal purposes—								
	(i) Drain flushing. „	3,125	36,000	34,954	44,671	5,000	600	..	11,000
	(ii) Road watering. „	1,126		2,165		1,000	1,200	..	500
	(iii) Parks and other public purposes. „	17,743		2,994		49,000	200	..	500
	(iv) Buildings. .. „	..		1,874		2,000	..	..	..
	(v) Charitable institutions, schools, etc, free or at reduced rates. „	..		..		16,000	..	..	..
	Total for municipal purposes. „	21,994	36,000	41,987	44,671	73,000	2,000	..	12,000
	Total for unmetered „	2,04,536	4,21,990	3,54,013	5,03,443	5,02,762	33,317	10,486	61,631
35	Metered—								
	(a) Sale of water by meter „	99,868	65,924	10,727	1,52,509	1,22,365	7,059	81,365	35,197
	(b) Meter rent .. „	2,539	4,718	2,499	21,831	7,211	219	3,161	2,824
	Total for metered .. „	1,02,407	70,642	13,226	1,74,340	1,29,576	7,278	84,526	38,021
36	Total income (items 34 and 35). „	3,06,943	4,92,632	3,67,239	6,77,783	6,32,338	40,595	95,012	99,652
	Income and working charges								
37	Receipt per 1,000 gallons supplied through meter. Annas	4·92	8·04	2·02	3·38	6·10	6·99	25·80	29·02
38	Receipt per 1,000 gallons supplied through assessment rating. „	2·75	3·51	2·25	3·45	2·80	1·02	2·33	21·34
39	Receipt per 1,000 gallons on total consumption. „	3·24	3·82	2·24	3·43	3·14	1·20	12·21	23·74
40	Profit or loss per 1,000 gallons supplied „	Profit 1·06	Profit 0·60	Profit 0·21	Profit 1·51	Profit 0·41	Profit 0·16	Loss 3·55	Profit 5·11
41	Profit or loss on year's working. Rupees	„ 1,00,455	„ 77,057	„ 34,384	„ 2,97,578	„ 83,139	„ 5,438	„ 27,603	„ 21,489

(a) Includes Rs.25,000 Government subsidy.
(b) Includes Rs.48,936 credited to municipal Electric Supply for power.
(c) Includes Rs.38,712 credited to municipal Electric Supply for power.

DIX A—(*concluded*)
in the United Provinces for the year 1934–35

Dehra Dun	Jhansi	Mirzapur	Muttra	Fyzabad	Hardwar	Unao	Kosi	Fatehpur Sikri	Aligarh	Almora	Gola-gokaran-nath	Haldwani
Nil	2	84	49	45	10	Nil	Nil	2	139	1	Nil	7
1	132	2,923	2,056	1,429	204	190	4	2	795	6	Nil	127
4	Nil	1	43	3	10	*15	6	4	Nil	Nil	2	Nil
50	10	1	65	50	52	71	31	6	Nil	Nil	10	Nil
1	1	Nil	1	Nil	1	Nil	1	Nil	Nil	Nil	Nil	Nil
3	3	9	31	Nil	3	Nil	6	Nil	Nil	Nil	Nil	1
53	13	10	96	50	55	71	37	6	Nil	Nil	10	1
10,245	23,661	11,470	53,171	34,443	(c)30,573	10,725	5,103	4,061	27,835	2,232	2,980	4,527
12,871	Nil	Nil	18,350	11,426	11,424	1,408	Nil	Nil	Nil	6,678	Nil	Nil
23,116	23,661	11,470	71,521	45,869	41,997	12,133	5,103	4,061	27,835	8,910	2,980	4,527
Nil	2·28	Nil	2·47	3·16	3·74	2,81	3·09	2·12	2·96	Nil	17 45	Nil
1·49	5·03	0·53	3·10	2·90	4·79	3·11	3·43	4·37	4·35	1·08	12·57	0·87
1·87	Nil	Nil	1·07	0·96	1·79	0·41	Nil	Nil	Nil	3·23	Nil	Nil
3·36	5·03	0·53	4·17	3·86	6·58	3·52	3·43	4·37	4·35	4·31	12·57	0·87
..	19,866	14,217	72,141	35,653	19,199	6,953	7,339	2,421	..	..	..	..
..	2,585	15,064	..	4,951	786	878	..	..	15,617	420	..	3,235
3,133	406	2,348	3,238	1,193	(d)30,556	298	363	27	1,146	40	..	..
3,133	22,857	31,629	75,379	41,802	50,541	8,129	7,702	2,448	16,763	460	not realized	3,235
..	..	175	4,816	..	..	..	..	..	..	..	..	..
824	..	491	538	2,500	..	..	..	..	..	..	..	..
..	..	10,034	1,767	..	1,000	..	72	..	..	..	..	..
..	..	2,650	..	..	..	..	..	..	..	..	..	..
..	2,143	285	1,144	..	..	..	..	..	..	..	..	..
824	2,143	13,685	8,265	2,500	1,000	..	72	..	..	..	..	..
3,957	25,000	45,314	83,644	44,302	51,541	8,129	7,774	2,448	16,763	460	..	3,235
§14,625	1,482	2,224	1,767	1,626	2,658	1,507	417	40	Nil	Nil	90	Free
55	42	17	407	527	197	90	107	20	Nil	Nil	109	232
14,680	1,524	2,241	2,174	2,153	2,855	1,597	524	60	Nil	Nil	199	232
18,637	26,524	47,555	85,818	46,455	54,396	9,726	8,298	2,508	16,763	460	199	3,467
21·82	7·54	4·03	9·26	2·99	14·12	5·06	5·17	10·55	Nil	Nil	13·32	..
0·64	5·55	2·16	4·95	3·98	8·34	2·59	5·62	2·65	2·62	0·22	Nil	0·66
2·71	5·64	2·21	5·01	3·91	8·53	2·82	5·58	2·70	2·62	0·22	0·84	0·67
Loss 0·65	Profit 0·61	Profit 1·68	Profit 0·84	Profit 0·05	Profit 1·95	Loss 0·70	Profit 2·15	Loss 1·37	Loss 1·78	Loss 4·09	Loss 11·78	Loss 0·20
„ 4,479	„ 2,863	„ 36,085	„ 14,297	„ 586	„ 12,399	„ 2,407	„ 3,195	„ 1,553	„ 11,072	„ 3,450	„ 2,781	„ 1,060

*Includes three connections for Municipal purposes.
§Includes Rs.766 for supplying 0·524 million gallons of water for Municipal purposes.
(*d*) Includes Rs.30,000 from fair fund.
(*c*) Includes Rs.19,981 debited to water works for cost of electric energy.

APPENDIX B

Statement showing total demand, amount recovered, remissions and arrears of various water works in the United Provinces during the year 1934–35

Water works stations	Total demand	Total amount recovered	Total amount of remissions	Arrears on 31st March, 1935		Remarks
				Total amount	Percentage on total demand	
	Rs	Rs.	Rs.	Rs.		
1. Agra	5,28,509	3,06,943	11,538	2,05,028	39·16	
2. Allahabad ..	5,34,971	4,92,632	4,515	37,824	7·07	
3. Benares ..	4,95,682	3,67,239	14,301	1,14,142	23·03	
4. Cawnpore ..	7,96,019	6,77,783	15,192	1,03,044	13·94	
5. Lucknow ..	6,55,323	6,32,339	112	22,873	3·49	
6. Meerut ..	44,551	40,595	126	3,832	8·71	Excess recovery Rs.52.
7. Mussoorie ..	1,05,710	95,012	4,538	6,366	6·02	Excess recovery Rs.200.
8. Naini Tal ..	1,03,670	99,052	269	3,749	3·05	
9. Dehra Dun ..	18,683	18,637	..	108	0·58	Excess recovery Rs 62.
10. Jhansi ..	29,237	26,524	904	1,815	6·21	Excess recovery Rs.6.
11. Mirzapur ..	64,683	47,555	218	16,107	24·90	Rebate Rs.803.
12. Muttra ..	96,881	85,818	2,606	8,457	3·73	
13. Fyzabad ..	55,715	46,455	4,359	4,901	8·80	
14. Hardwar ..	54,396	54,396	..	..	..	
15. Unao.. ..	15,312	9,726	1,038	4,548	29·70	
16. Kosi	8,687	8,298	310	79	0·01	
17. Fatehpur-Sikri ..	4,239	2,508	109	2,261	52·63	Excess recovery Rs.609.
18. Aligarh ..	17,513	16,763	..	750	4·28	
19. Almora ..	485	460	25	..	..	
20. Golagokaranath	1,105	199	..	906	81·99	
21. Haldwani ..	3,822	3,487	98	317	8·29	
Total ..	36,35,199	30,33,000	60,198	5,42,127	14·91	

APPENDIX C

Statement showing number and size of all connexions; also number and size of metered connexions for the year 1934-35

Name of stations	Size of connexions																			Remarks
	1/8"	3/16"	1/4"	3/8"	1/2"	5/8"	3/4"	1"	1¼"	1½"	2"	3"	4"	6"	8"	10"	12"	Other connexions	Total	
Unmetered Supplies																				
Agra	1,092	..	1,133	2,300	504	..	156	71	..	14	1	..	..	..	..	..	..	..	5,771	
Allahabad	1,200	..	1,460	3,125	1,426	60	50	90	..	10	9	..	..	..	..	..	..	..	7,480	
Benares	4,296	..	11,166	979	904	..	..	..	..	..	..	..	..	..	..	..	..	..	17,345	
Cawnpore	..	651	5,452	2,999	1,792	8	405	440	23	93	..	..	..	..	..	..	..	7*	11,871	*Tee connexions.
Lucknow	..	..	..	11,075	2,050	107	165	165	12	7	6	..	..	..	..	..	..	..	13,587	
Meerut	..	..	..	1,681	427	..	22	10	..	..	..	..	..	..	..	..	..	..	2,090	
Mussoorie	..	..	..	..	27	..	..	..	..	..	..	..	..	..	..	..	..	..	27	
Naini Tal	..	..	..	..	1	..	2	1	1	..	..	..	..	..	..	..	..	2†	7	†2½ ,, connexion.
Dehra Dun	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	1	
Jhansi	..	..	11	..	107	..	6	3	..	1	4	..	..	..	..	..	..	..	132	
Mirzapur	49	3	2,054	584	115	6	110	6	45	..	..	1	..	..	..	..	..	..	2,923	
Muttra	731	..	1,133	81	107	..	4	..	..	..	..	..	..	..	..	..	..	..	2,056	
Fyzabad	1,068	..	285	69	57	..	..	..	..	..	..	..	..	..	..	..	..	..	1,429	
Hardwar	95	..	50	8	51	..	..	..	..	..	..	..	..	..	..	..	..	..	204	
Unao	89	..	70	24	7	..	..	..	..	..	..	..	..	..	..	..	..	..	190	
Kosi	..	..	..	4	..	..	..	..	..	..	..	..	..	..	..	..	..	..	4	
Fatehpur-Sikri	..	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	
Aligarh	443	272	71	9	..	..	..	..	..	..	..	..	..	..	..	..	..	..	795	
Almora	..	..	..	..	..	1	1	4	..	..	..	..	..	..	..	..	..	..	6	
Golagokarannath	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
Haldwani	..	..	40	18	61	..	5	3	..	..	..	..	..	..	..	..	..	..	127	
Total ..	9,062	926	22,876	23,357	7,638	182	926	793	81	125	20	1	..	..	..	..	..	9	65,907	
Metered Supplies																				
Agra	19	..	1	36	108	..	59	41	..	25	2	5	..	5	2	..	1	..	304	
Allahabad	..	..	..	1	132	13	60	63	..	18	21	6	14	2	1	..	..	..	331	
Benares	..	..	..	..	406	..	27	30	13	9	5	4	1	..	..	..	..	..	495	
Cawnpore	..	..	..	..	1,461	..	274	402	9	160	56	36	10	..	..	..	..	..	2,408	
Lucknow	..	..	..	..	278	..	136	130	..	46	13	6	5	..	1	1	..	..	616	
Meerut	..	..	..	37	..	..	3	4	..	..	..	2	..	..	..	..	..	..	46	
Mussoorie	..	..	..	..	716	..	51	6	..	..	..	2	..	..	..	..	..	..	775	
Naini Tal	..	..	..	..	181	200	18	3	..	1	..	..	..	..	..	..	..	..	413	
Dehra Dun	..	..	..	..	30	..	7	15	..	1	..	..	..	..	..	..	..	..	53	
Jhansi	..	..	..	..	..	..	1	7	..	2	3	..	..	..	..	..	..	..	13	
Mirzapur	..	..	..	..	4	..	4	..	1	..	..	1	..	..	..	..	..	..	10	
Muttra	65	..	25	..	5	..	1	..	..	..	..	..	..	..	..	..	..	..	96	
Fyzabad	..	..	..	..	32	..	6	12	..	..	..	..	..	..	..	..	..	..	50	
Hardwar	10	..	9	1	32	..	1	2	..	..	..	..	..	..	..	..	..	..	55	
Unao	..	..	..	64	6	..	1	..	..	..	..	..	..	..	..	..	..	..	71	
Kosi	..	..	1	22	12	..	..	1	..	..	1	..	..	..	..	..	..	..	37	
Fatehpur-Sikri	..	..	..	..	6	..	..	..	..	..	..	..	..	..	..	..	..	..	6	
Aligarh	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
Almora	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
Golagokarannath	..	..	..	10	..	..	..	..	..	..	..	..	..	..	..	..	..	..	10	
Haldwani	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	1	
Total ..	94	..	36	171	3,859	273	669	716	23	262	101	62	31	7	4	1	1	..	5,810	

APPEN

Annual maintenance accounts of water works

Particulars	Agra	Allahabad	Benares	Cawnpore	Lucknow	Meerut	Mussoorie	Naini Tal
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
I—Establishment—								
(a) Engineers ..	10,500	9,274	23,825	13,200	6,365	3,720	1,075	2,600
(b) Mechanics and drivers	20,321	22,074	5,585	37,380	19,665	10,717	10,544	3,989
(c) Workshops ..	4,792	5,157	7,797	5,514	5,103	..	..	1,003
(d) Clerical staff ..	1,182	5,322	4,820	3,840	3,702	986	..	252
(e) Menial staff ..	3,260	8,072	14,024	2,848	14,554	971	4,385	372
(f) Office contingencies ..	2,766	858	1,247	331	1,464	1,134	1,800	273
(g) Rent	..	869	547	674	827	60	..	..
(h) Cost of collecting water revenue, taxes and services rendered by other departments.	18,525	26,600	12,243	46,013	55,252	..	..	667
II—Supplies—								
(a) Fuel	(a)33,760	(b)863	(c)540	(d)2,807	(e)..	(f)..	(g)1,005	(h)..
(b) Power supply ..	(a)19,227	(b)1,55,308	(c)1,30,817	(d)1,13,224	(e)2,09,624	..	..	..
(c) Lubricants ..	2,736	1,795	759	1,022	987	149	3,000	324
(d) Waste	..	24	397	477	69	236	2,022	97
(e) Packing	..	388	138	..	966	295	..	37
(f) Stores	2,386	2,015	3,992	9,920	3,785	904	1,074	434
III—Repairs and maintenance—								
(a) River training ..	4,016	..	40	6	..	..	..	..
(b) Channels and wells ..	4,888	4,492	30	..	2,236	65	..	..
(c) Settling tanks ..	888	..	3,580	768	1,905	98	..	..
(d) Filter beds ..	3,757	11,006	5,495		2,763	1,799	..	..
(e) Purchase of sand ..	662	5,300	2,944	3,738	12,863	2,740	..	..
(f) Alumina ferric compound.	1,102	6,237	4,340	9,212	20,968	3,452	..	..
(g) Chlorinating chemicals	3,351	2,885	1,065	..	6,131	..	..	327
(h) Distribution system and fittings.	..	1,810	377	5,127	6,694	539	3,653	798
(i) Standposts and hydrants	..	44		..	Included in III(h)	..	248	..
(j) Meters	..	4	16	18,698	394	..	1,740	283
(k) Buildings ..	..	1,109	3,000	446	6,888	420	151	192
(l) Machinery ..	4,843	4,468	5,394	1,968	5,633	740	463	794
(m) Tools and plant ..	..	41	..	4,762	1,511	..	..	115
IV—Other charges								
(a) Water analysis ..	..	1,024	2,814	1,308	2,464	1,100	1,099	1,411
(b) Canal department dues	1,000	..	..	75,000	..	5,092	..	..
(c) Miscellaneous ..	..	..	..	..	8,741	..	295	..
Total maintenance ..	1,44,002	2,76,539	2,44,765	3,45,683	4,01,554	35,157	32,654	19,912
V—Repayment of loan charges (with interest) ..	62,486	1,39,056	88,090	34,522	1,47,645	..	41,125	25,589
VI—Credit to municipal electric supply for power ..	..	..	..	..	..	..	48,936	‡38,712
TOTAL CHARGES ..	2,06,488	4,15,595	3,32,855	3,80,205	5,49,199	35,157	1,22,615	78,213

(a) Rupees 16,561 less on consumption. Electrical charges includes Rs. 1,590 for Maithan and Chili Int and Rs. 1,993 for Rikabganj and Fort Boosting sets.

(b) Rupees 6,773 less on consumption. Fuel oil used for Daraganj and coal for pumping water by steam engine, workshop and municipal purposes.

(c) Rupees 12,835 less on consumption. Coal used for workshop and municipal purposes.

(d) Rupees 506 less on consumption. Coal used for pumping water by steam engines, workshop and municipal purposes.

(e) Rupees 10,740 in excess of consumption. Coal worth Rs. 215 used for workshop, etc. and municipal purposes.

(f) Pumping done by turbines. No fuel was purchased during the year. Last year's stock was used for banking engines and workshop, etc.

(g) Coal used at pumping stations in workshop for minor repairs.

(h) No coal was purchased during the year. Last year's stock was used for minor repair works.

‡Rs. 35,244 for pumping and Rs. 3,468 for light, etc.

DIX D

in the United Provinces during the year 1934–35

Dehra Dun	Jhansi	Mirzapur	Muttra	Fyzabad	Hardwar	Unao	Kosi	Fatehpur-Sikri	Aligarh	Almora	Golagokarannath	Haldwani
Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
..	..	3,947	2,763	3,930	3,660	1,018	..	1,420	1,860	..	1,348	
..	1,662		2,291	5,405	2,617	889	1,886	209	2,103	..	360	
..	..	..	658	1,657	921	..	..	..	..	..	..	2,169
2,830	..	930	362	1,036	637	195	..	..	360	..	..	
5,023	1,656	262	1,369	1,991	840	732	96	219	648	4,342	222	
263	340	271	109	635	166	20	222	66	55	..	16	2
..	..	..	350	..	..	2	..	12	..	..	..	..
..	..	3,178	6,724	5,150	..	778	540	180	930	..	..	..
..	(*i*)9,310	..	(*j*)17	(*k*)7,968	..	(*l*)3,655	(*m*)962	(*n*)737	..	..	(*p*)373	..
..	..	..	(*j*)37,122	..	..	..	..	..	(*o*)19,879	..	..	..
..	257	..	260	2,162	32	1,929	777	474	..	...	128	5
..	13	..	12	54	35	98	48	24	24	..	20	..
..	149	..	..	..	56	..	..	24	..	..	..	..
..	126	..	89	255	..	199	42	120	..	..	10	45
..	..	..	..	..	..	..	..	..	..	453§	..	..
..	..	..	..	..	130	..	..	..	..	..	..	..
..	..	835*	..	..	..	..	..	..	..	..	..	27
..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	440	..	..	..	..	..	..	257	..	..	1,238
..	..	..	..	..	..	..	..	..	..	..	10	62
2,159	524	838	179	422	98	..	69	..	34	854	96	445
..	25	505	346	29	174	..	..	37	57	..	2	..
..	171	..	..	..	42	..	..	..	..	..	..	..
..	100	59	216	1,153	154	14	127	6	..	..	100	358
..	1,131	..	79	2,165	408	106	153	264	885	..	4	..
..	395	..	329	..	24	182	75	43	..	5	40	..
..	202	350	..	331	..	913	101	224	419	42	..	175
..	6,389	..	..	..	..	..	..	..	..	..	247	..
..	101	460	91	..	598	..	..	..	924	36	4	1
10,245	23,661	11,470	59,171	34,443	10,592	10,725	5,103	4,061	27,835	2,232	2,980	4,527
12,871	..	..	18,350	11,426	11,424	1,408	..	..	..	6,678	..	..
..	..	..	..	..	19,981	..	..	..	..	..	..	..
23,116	23,661	11,470	71,521	45,869	41,997	12,133	5,103	4,061	27,835	8,910	2,980	4,527

(*i*) Rs. 810 in excess of consumption.
(*j*) Rs. 153 less on consumption. Fuel oil used for pumping by Diesel engines.
(*k*) Rs. 684 in excess of consumption.
(*l*) Rs. 192 ditto.
(*m*) Rs. 27 less on consumption.
(*n*) Rs. 65 ditto.
(*o*) Rs. 427 in excess of consumption.
(*p*) Rs. 28 ditto.
* Repairs to reservoirs.
§ Repairs to tanks and springs.

APPENDIX E

Statement showing costs, initial, of subsequent extensions and improvements, chargeable to capital and balances of outstanding loans of the various water works in the United Provinces for the year ending 31st March, 1935.

Water works stations	Initial capital costs*	Cost of subsequent extensions*	Expenditure during the year				Total cost of works	Balances of outstanding loans
			Out of Government grant	Out of Government loan	Out of revenue	Total		
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Agra	11,50,761	24,40,214	..	3,211	11,036	14,247	36,25,222	4,25,218
Allahabad ..	16,24,061	29,38,316	35	1,564	4,911	6,510	45,68,887	13,36,674
Benares ..	25,61,881	18,92,685	..	..	6,901	6,901	44,61,467	10,75,243
Cawnpore ..	14,44,570	22,43,313	..	..	87,048	87,048	37,74,931	2,56,855
Lucknow ..	15,15,736	50,89,045	..	..	43,066	43,066	66,47,847	**11,99,632
Meerut ..	7,51,710	85,882	..	..	4,986	4,986	8,42,578	..
Mussoorie ..	4,79,754	8,16,473	..	..	1,524	1,524	12,97,751	3,06,193
Naini Tal ..	2,47,000	8,12,241	..	..	1,450	1,450	10,60,691	2,83,154
Debra Dun ..	97,241	4,20,606	3,699	..	15,757	19,456	5,27,893	1,17,073
Jhansi ..	96,556	1,26,759	4,600	..	6,326	10,926	2,34,150	..
Mirzapur ..	5,93,492	1,4[illegible],499	..	..	3,061	3,061	7,47,052	..
Muttra ..	5,17,288	1,51,907	..	..	5,671	5,671	6,74,866	77,834
Fyzabad ..	9,48,662	93,407	10,445	500	888	11,833	10,53,902	1,15,806
Hardwar ..	1,96,919	3,18,063	3,715	..	..	3,715	5,18,700	1,25,593
Unao ..	1,18,664	75,144	..	..	923	923	1,94,731	6,787
Kosi ..	70,322	6,716	..	..	..	..	77,033	..
Fatehpur-Sikri ..	52,034	15,874	..	..	294	294	68,202	..
Aligarh ..	5,70,932	23,367	..	..	..	..	5,94,350	..
Almora ..	1,73,657	1,252	..	..	149	149	1,75,058	82,640
Golagokarannath ..	99,291	9,756	..	..	275	275	1,09,322	..
Haldwani ..	1,10,233	5,900	..	..	..	..	1,16,133	..
Total ..	1,34,45,824	1,77,12,512	21,908	5,275	1,94,766	2,21,944	3,13,80,280	54,08,757

* Include grants and loans from Government.

** Includes Rs.1,62,039 on account of balance of overdue instalments of loan taken for water works reorganization scheme and Rs.2,241 loan taken from Husainabad Trust for re-alignment of water main on Ormmelin Road.

APPENDIX F

Statement showing filter area out of operation, rate of filtration, and results of water analysis of the water works in the United Provinces during the year 1934-35.

Water works	Sand filter area out of operation per million gallons pumped square feet	Filtration rate in gallons per square foot per day of sand filter			Water from supply mains							Remarks
					Chemical analyses			Bacteriological analyses				
		Maximum	Minimum	Average	Good	Bad	Total	Number of samples tested	Number of samples containing over 100 colonies	Average number of microbes per c. c.	Percentage (on total) of samples over 100 per c. c.	
Agra	4,608	55·00 *2,542	6·00 *1,400	30·01 *2,062	3	..	3	552	105	48·90	19·00	*For Paterson filters
Allahabad ..	10,680	50·00 *1,874	18·30 *1,114	26·15 *1,576	3	1	4	509	21	34·00	4·10	
Benares ..	7,570	50·00	6·25	41·61	4	..	4	538	176	144·70	32·70	
Cawnpore ..	968	60·00	19·00	48·34	2	2	4	696	..	19·90	..	
Lucknow ..	3,703	75·00 *2,217	6·20 *843	37·66 *1,734	3	1	4	227	1	16·90	0·40	
Meerut ..	5,675	31·00	25·00	30·63	1	..	1	277	1	44·20	0·30	
Mussoorie ..	Water supply from deep spring and is not filtered.				5	..	5	151	16	17·60	10·50	Hard water.
Naini Tal ..					6	2	8	105	11	53·60	10·40	Ditto.
Debra Dun ..					12	..	12	ch. 97 unch. 50	11	55·30	11·30	Free ammonia slightly high in two samples.
									23	134·20	46·00	Hard water.
Jhansi ..	Unfiltered supply				1	1	2	11	9	133·00	81·80	
Mirzapur ..	Gravitation supply				..	..	..	78	11	95·80	14·10	
Muttra ..	Tube-well supply.				4	..	4	75	6	12·30	8·00	
Fyzabad ..					1	2	3	96	1	13·10	1·04	
Hardwar ..					17	..	17	298	24	11·08	8·05	
Unao					3	..	3	76	5	32·05	6·50	High chlorine and nitrate figures.
Kosi					2	..	2	20	1	7·10	5·00	High chlorine contents.
Fatehpur Sikri ..					2	..	2	10	3	62·70	30·00	Very high, solids, chlorine and hardness.
Aligarh ..					6	..	6	94	4	43·10	4·20	High chlorine and nitrate figures.
Almora ..	Gravitation supply				No test done.							
Golagokarannath ..	Tube-well supply				..	..	..	5	3	104·80	60·00	
Haldwani ..	Gravitation supply				4	..	4	12	9	133·70	75·00	

APPENDIX G

Details of pumps, filters, tanks, reservoirs, mains, and other details of the water works in the United Provinces for 1934–35

Item Number	Particulars	Agra	Allahabad	Benares	Cawnpore	Lucknow	Meerut	Mussoorie	Naini Tal	Dehra Dun	Jhansi	Mirzapur	Mathura	Etawah	Hardwar	Unao	Kosi	Dalakpur Sikri	Aligarh	Almora	Tala Gokarna Sidh	Haldwani
1	Floor levels;																					
	Unfiltered Station, R. L.	505·00'	280·00'	354·00'	492·00'	357·50'	735·00'	Murray Spring 5,498'	"	"	765·67'	"	360·00'	Old station 332·51'	Pump house no. 1= 801·68'.	411·24'	612·40'	507·00'	"	4,841·50'	210·00'	"
	Filtered station, R. L.	510·00'	281·00'	352·00'	410·00'	365·30'	735·50'	Dhilwan Spring 5,300'	"	"	"	"	"	New station 332·51'	Pump house no. 2= 807·00'.	"	"	"	"	"	"	"
2	Highest water level during the year, R. L.	495·00'	276·02'	341·25'	372·00'	349·03'	"	Mackinon Spring 6,000'	"	"	762·00'	"	"	"	Pump house no. 3= 807·00'.	"	607·72'	540·01'	"	"	436·75'	"
3	Lowest water level during the year, R. L.	482·10'	252·00'	198·20'	357·30'	340·50'	"	Landour 6,860'	"	"	737·07'	"	"	"	"	"	559·75'	51·00'	"	"	424·75'	"
4	Particulars of plant;																					
	Unfiltered Station	2 Diesel sets .. 1 L. D. Worthington. 3 Mather and Platt motor driven vertical spindle centrifugal pumps.	3 Mather and Platt "Lowness" centrifugal pumps direct driven by A. C. motors.	1 H. D. Worthington (Standby). 2 Gnome sets (Standby). 2 Worthington vertical spindle centrifugal pumps direct driven by G. E. C., A. C. motors.	1 Triple expansion rotary. (Standby). 2 Vertical spindle centrifugal pumps direct driven by A. C. motors at river side. 2 Sets of centrifugal pumps direct driven by electric motors at unfiltered station Ranighatta.	2 Mather and Platt motor driven "Mulleans" centrifugal pumps. 1 Hadland centrifugal vertical pump driven by A. C. motor.	2 Water power turbine. 1 Semi-portable engine.	Murray spring: Two sets electrically driven gravel three run pumps single reciprocating gearing. Dhilwan spring; Two sets as above. Mackinon Spring; Two pumps as above but with double reduction gearing. One semi-Diesel oil engine. Landour; Two sets of Worthington-Simpson three stage single plunger power pumps driven by Metropolitan-Vickers induction motors.	Main station. High Zone.—2 triple run motor driven gravel pumps. Inter Zone.—3 Mather and Platt motor driven "Pluvioso" Turbine pumps. Low Zone.—2 Mather and Platt motor driven "Pluvioso" Turbine pumps. Lake side. 2 Motor driven Worthington centrifugal pumps. One spring pump driven by A. C. motor.	Gravitation supply.	2 Worthington compound engines and pumps.	Gravitation supply.	2 Two cylinder Mirrlees Diesel engines D. C. generator motor driven Mather and Platt centrifugal pumps. 1 Set converted to A. C. motor taking energy from the Electric Supply Company. 1 A. C. motor driving Sullivan air compressor for air lift pump and one Worthington centrifugal pump.	Old station 2 Two cylinder Mirrlees engines and 2 Gnome driven Kaitler and Platt centrifugal pumps. New station 1 Single stage double acting Sullivan air compressor motor belt driven. 1 Horizontal diesel driven electric motor centrifugal pump.	3 Mather and Platt centrifugal pumps driven by A. C. motors.	2 Thirty B. H. P. Tangye oil engines. 3 Sullivan air compressor. 3 Air lift pumps in tube-wells and two of Worthington centrifugal pumps.	1 Sixteen B. H. P. Tangye crude oil engine. 1 Single stage double belt driven Sullivan Air Compressor. 1 Standard Sullivan air lift pump in tube-well. 1 belt driven Worthington-Simpson two stage centrifugal pump.	1 Sixteen B. H. P. Tangye crude oil engine. 1 Single stage double acting Sullivan horizontal air Compressor. 1 Sullivan air lift pump in tube-well. 1 Duplex reciprocating pump.	High Zone 3 Hadland Engineering horizontal centrifugal pumps direct driven by A. C. motors. Low Zone. 4 Hadland Engineering borehole vertical pumps direct driven by A. C. motors.	Gravitation supply.	3 sets Worthington-Simpson three stage vertical turbine pumps each driven by Blackstone two stroke crude oil engines of belt transmission and gears.	Gravitation supply.
	Filtered Station ..	2 Bellin and Morcom. 1 H. D. Worthington. 2 Bisons. 2 Motor driven Worthington Simpson centrifugal pumps at Mathian and Chilli Ink. 2 Motor driven Mather and Platt pumps at Bhagwan. 2 Motor driven Mather and Platt pumps at Fort.	3 Mather and Platt "Lowness" centrifugal pumps direct driven by A. C. motors. 2 Bisons (Standby).	2 pairs of compound Beams (Standby). 1 H. D. Worthington (Standby). 4 horizontal centrifugal pumps direct driven by G. E. C., A. C. motors. 2 tube-wells worked by centrifugal pumps with A. C. motors.	2 L. D. Worthington (Standby). 1 H. D. Worthington (Standby). 4 sets of centrifugal pumps direct driven by A. C. motors.	3 Mather and Platt "Mulleans" centrifugal pumps driven by A. C. motors.	3 Water power turbines.	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
5	Capacity of pumps;																					
	Unfiltered station, G. P. M.	Diesel sets 3,000 each. L. D. Worthington 1,700. Mather & Platt centrifugal pumps 2,500 each.	Water pumps 2,000 each.	H. D. Worthington 2,500. Gnome 4,000 each. Motor pumps 6,000 each.	Triple expansion 5,000. Motor pumps 3,000. River wells 3,500 each. Ranighatta 2,000 each.	Motor pumps 1,000 each. Hadland pump 10,000.	1,500 each ..	Murray Spring 185 Dhilwan Spring 142 Mackinon Spring 83 Landour 83.	Main station; H. R. 135 each. I. R. (1) 172. (2) 190. L. R. (1) 302. (2) 50. Lake 400 each. Spring 50.	"	375 each ..	"	1,000 each .. 150	Old station 100 each .. New station 300 each.	500 each ..	200 each ..	120	100 H. R. 300 each .. L. R. 150 each.	Gravitation supply.	[illegible]

APPENDIX G—(*continued*)

Details of pumps, filters, tanks, reservoirs, mains, and other details of the water works in the United Provinces for 1934-35

Item number.	Particulars	Agra	Allahabad	Benares	Cawnpore	Lucknow	Meerut	Mussoorie	Naini Tal	Dehra Dun	Jhansi	Mirzapur	Moradabad	Pratabgarh	Hardoi	Unao	Etah	Bijnagur-Sikri	Aligarh	Almora	Kalka-Dehra-Delhi	Ut
	Filtered water, c.f.w.m.	Bellas 2,500 each. II. D. Worthington 3,300. Beams 3,000 each. Worthington 500 each. At Etawah 750 each. At Fort 250 each.	Electric pumps 3,750 each. Beams 3,100 each	Beams 5,500 each. 4 motor driven centrifugal pumps:— 3—3,600 each 1—5,400. Tube well:— No 1 455. No. 2 830.	H. D. Worthington 4,710. L. D. Worthington 3,125 each. Motor pumps 3,800 each.	Motor pumps 6,030 each.	1,100 each	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
6	Number of:																					
	(a) Rising mains..	Three ..	Two.. ..	Two.. ..	Two.. ..	Two.. ..	Two.. ..	Four ..	Six	Not supplied ..	One ..	One ..	One ..	One ..	One ..	Two ..	One	One	Three ..	One (in different sections).	Nil	Nil.
	(b) Leading mains	Thirteen ..	Fourteen ..	Three ..	Nine ..	One ..	Not supplied	Six	Six	Four ..	One ..	Eight ..	Three ..	One ..	One ..	Nil	One	One	Two ..	Three ..	Two ..	Three.
	(c) Distribution mains.	Not supplied ..	Eleven ..	Thirteen ..	Fourteen ..	Twenty-one ..	Ten.. ..	Twenty-five ..	Three ..	Ten ..	Nineteen ..	Five ..	Fourteen ..	One ..	Five ..	Three ..	Five	Five.. ..	Eight ..	Five ..	Nil	Eight.
7	Length and size of:	Length feet / Size inch	Length feet / Size inch	Length feet / Size inch	Length feet / Size inch	Length feet / Size inch	Length feet / Size inch	Length feet / Size inch	Length feet / Size inch		Length feet / Size inch	Length feet / Size inch	Length feet / Size inch	Length feet / Size inch		Length feet / Size inch	Length feet / Size inch	Length feet / Size inch	Length feet / Size inch	Length feet / Size inch		
	(a) Rising mains ..	1. 10,000 24 2. 7,240 16 3. 10,470 8	1. 8,560 20 2. 8,560 20	1. 4,020 24 old. 2. 4,055 24 new.	1. 9,000 20 2. 9,000 20	1. 15,540 37 2. 17,360 36	1. 28,340 15 2. 6,300 18	1. 5,760 5 2. 2,165 4 3. 1,440 3½ 4. 3,000 3	1. 1,330 6 2. 2,587 5 3. 1,356 5 4. 4,910 5 5. 3,494 4 6. 3,464 3½	Not supplied ..	1. 19,372 9	1. 30,354 13	1. 4,917 12	1. 7,027 14	One connected to: Length feet / Size inch 1,030 15 931 12 688 10 677 5	1. 1,050 6 2. 810 5	1. 2,960 6	1. 2,963 6	1. 2,445 10 2. 1,165 8 3. 1,000 7	One connected to— Length feet / Size inch 828 3 2,289 2½ 4,049 2 5,714 1½ 913 1	Nil	Nil.
	(b) Leading mains ..	1. 4,000 18 2. 3,160 18 3. 8,950 20 4. 875 15 5. 3,650 12 6. 760 12 7. 1,000 12 8. 3,200 12 9. 930 10 10. 2,640 10 11. 1,850 9 12. 3,710 8 13. 1,400 7	1. 830 20 2. 5,591 25 3. 2,140 20 4. 13,520 16 5. 4,335 15 6. 5,065 16 7. 1,980 12 8. 1,020 10 9. 2,000 9 10. 4,950 8 11. 6,585 7 12. 3,481 6 13. 3,400 6 14. 4,916 4	1. 10,500 36 to 8 2. 31,040 30 to 6 3. 9,217 15	1. 7,300 22 2. 1,375 20 3. 610 25 4. 4,470 20 5. 1,650 18 6. 3,325 16 7. 3,724 14 8. 5,363 12 9. 2,800 10	1. 3,450 30	Not supplied ..	1. 7,080 4½ 2. 2,175 4 3. 5,320 3½ 4. 9,500 3 5. 7,145 2½ 6. 24,080 1½	1. 5,250 5 2. 3,390 3 3. 20,581 2½ 4. 10,070 2 5. 15,084 1½ 6. 3,050 1½	1. 1. 7,070 6 2. 17,495 5 3. 3,520 4 2. 4. 30,048 3 5. 83,160 2½ 6. 24,050 3 3. 4. 10,804 2	1. 958 10	1. 8,335 16 2. 9,830 15 3. 1,648 13 4. 1,921 10 5. 2,016 9 6. 3,742 8 7. 1,586 6 8. 1,020 4	1. 94 15 2. 1,155 14 3. 660 13	1. 60 15	One connected to: Length feet / Size inch 1,000 15 2,868 13 4,339 10 3,245 8 2,364 6 17,970 6 2,183 4 810 3	Nil ..	1. 1,125 7.	1. 3,104 3	1. 6,215 20 to 9 2. 9,677 18 to 7	1. 15,897 4 2. 47,000 3 3. 11,840 3	1. 828 6 2. 820 5 3. 2,000 4	1. 810 2. 820 3. 180
	(c) Distribution mains	Not supplied ..	1. 7,410 14 2. 6,864 12 3. 1,981 10 4. 3,973 9* 5. 14,573 8* 6. 10,835 7 7. 24,974 6* 8. 14,194 5 9. 37,178 4* 10. 37,445 3. 11. 14,235 2	304,171 18 to 2 Details are not available.	1. 600 15 2. 935 14 3. 2,300 12 4. 2,100 11 5. 3,695 10 6. 8,076 9 7. 14,085 8 8. 10,513 7 9. 37,500 6 10. 43,075 5 11. 46,511 4½ 12. 37,407 3 13. 4,131 3 14. 2,119 3	1. 1,200 31 2. 3,100 30 3. 6,917 33 4. 3,411 16 5. 4,700 15 6. 9,677 13 7. 7,035 12 8. 9,000 11 9. 4,750 10 10. 11,667 9 11. 12,978 8 12. 15,904 7 13. 18,009 6 14. 26,521 5 15. 69,148 4 16. 156,707 3 17. 9,350 2 18. 990 1½ 19. 2,015 6 20. 1,704 4 21. 1,581 3	Length feet / Size inch 1. 504 11 2. 613 10 3. 9,225 7 4. 3,831 6 5. 4,965 5 6. 11,093 4 7. 33,520 3 8. 3,747 2 9. 720 1 10. 501 ½	1. 1. 18,905 3 to 6. 7. 8. 9. 10. 11. 2,350 2½ 12. 13. 14. 4,450 1½ 20. 21. 22. 23. 24. 25. 13,750 1 26. 0,600 ½	1. 1,035 1½ 2. 30,135 1 3. 40,704 ½	1. 4,020 5 2. 10,893 4½ 3. 18,790 3 4. 10,718 2½ 5. 10,011 2 6. 4,400 1½ 7. 7,250 1½ 8. 13,718 1 9. 3,792 ½ 10. 989 ½	1. 3,570 9 2. 1,860 6 3. 6,075 6 4. 1,656 6 5. 3,009 4 6. 6,050 4 7. 5,704 4 8. 1,325 4 9. 1,065 4 10. 760 3 11. 640 2 12. 650 2 13. 690 2 14. 18 2 15. 15 2 16. 15 2 17. 16 2 18. 15 2 19. 15 2	1. 567 7 2. 1,396 6 3. 3,007 5 4. 6,058 4 5. 10,416 3	1. 600 12 2. 1,155 9 3. 660 8 4. 2,640 7 5. 3,030 6 6. 3,795 5 7. 10,045 4 8. 21,004 3 9. 650 2½ 10. 9,680 2 11. 180 1½ 12. 14,076 1 13. 4,620 ½ 14. 3,068 ½	One connected to— Length feet / Size inch 40 15 180 14 60 13 1,275 10 9,855 9 1,660 8 7,135 7 7,860 6 7,050 5 10,360 4 26,016 3	1. 5,000 6 2. 3,000 4 3. 1,320 4 4. 1,050 3 5. 1,260 3	Length feet / Size inch 1. 981 5 2. 1,183 4 3. & 22,021 4	1. 1,100 5 2. 1,300 4 3. 3,813 3 4. 2,704 2½ 5. 598 3	1. 491 15 2. 458 13 3. 980 1. 4. 1,065 ½ 5. 135 ½	1. 75 9 2. 768 6 3. 6,364 5 4. 9,843 3 5. 22,035 3 6. 10,744 4 7. 12,228 3 8. 9,597 2½	1. 4,011 3 2. 3,040 4 3. 1,035 3 4. 188 2½ 5. 100 1½	Nil	1. 430 2. 2,760 3. 2,115 4. 600 5. 815 6. 677 7. 1,385 8. 3,000
8	Number of settling tanks.	Five ..	Three ..	Three ..	Five ..	Three ..	Three ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
9	Size of settling tanks	203' × 151' × 10' each.	Two 340' × 200' bottom 300' × 100'. Length 18,172 each.	Nos. 1 and 3—400'-9" × 225'-9" × 15' each. No. 2—400'-6" × 225'-6" × 12'.	Three—340'-6" × 242'-6" × 15' each Two—300'-6" × 224' × 8' each.	240' × 100' bottom 200' × 100' top. 12'-6 deep each.	100' × 60'-6" × 12' each.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..

* Rising mains are included in the distribution mains.

† Includes 11,324 ft. length of 6 inch mains.

‡ This is one length of 18" pipe and element for rising and leading.

§ This is common to leading and distribution.

APPENDIX G—(*continued*)

Details of pumps, filters, tanks, reservoirs, mains, and other details of the water works in the United Provinces for 1934-35

Item number	Particulars	Agra	Allahabad	Benares	Cawnpore	Lucknow	Meerut	Mussoorie	Naini Tal	Dehra Dun	Jhansi	Mirzapur	Bareilly	Pilibhit	Hardoi	Unao	Etah	Fatehpur-Sikri	Aligarh	Almora	Soh (Soharan Rohi)	Haldwani
10	Capacity of settling tanks. Gallons.	3,200,000 each ..	Nos. 1 and 2—4,500,000 each, No. 3—1,935,000.	Nos. 1 and 2—3,040,000 each, No. 3—37,22,140.	Three—7,540,450 each. Two—15,080,000 each.	6,024,000 each ..	339,000 each ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
11	Number of—																					
	(a) Slow sand filters	Seven ..	Six	Ten	Five Twelve Tuorh Chabal.	Seven ..	Four ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	(b) Mechanical filters.	Two	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	(c) Pulsation filters	Ten	Five	..	..	Ten	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
12	Size of—																					
	(a) Slow sand filters	230' X 130' each	150' X 100' each	300' X 100' each	300' X 100' each Punch Chabal—150' X 85' each	300' X 160' X 7' each.	150' X 100' each	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	(b) Mechanical filters.	12' dia. X depth each.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	(c) Pulsation filters	15' X 15½' ..	20' X 15' X 20' each	..	..	22' X 16' X 10' each.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
13	Number of clear water reservoirs.	Three ..	Two ..	Two ..	Three ..	Two ..	One ..	Six	One	..	..	..	..	..	..	..	..	..	..	One	..	* One tank of six parts.
14	Size of clear water reservoirs.	183' X 108' X 10' each.	110'-8" X 181'-8" X 13' each.	176½' X 143½' X 13' each.	Two old—150' X 106½' X 14½' each One new—180' X 207' X 14½'.	102' X 107' X 12' each.	222' X 48' X 7' ..	1. 48' X 35' X 8' Harry Spring. 2. 32' X 32' X 8' Mothiam Spring. 3. 45 X 35' X 8' Hollari Spring. 4. 9—14' dia. X 12' each. Landour.	50' X 40' X 6' ..	..	..	..	..	..	..	..	..	..	..	38½' X 32½' X 5½'	..	9—1' X 7'—9" X 10' of each part.
15	Capacity of clear water reservoirs. Gallons.	150,000 each ..	1,103,760 each ..	1,551,068 each ..	Two old—1,151,000 each One new—3,100,000.	700,500 each ..	110,000 ..	1. 60,000 .. 2. 30,000. 3. 60,000. 4. 9—10,000 each.	67,500.. ..	..	..	..	..	..	..	..	..	..	..	10,000 ..	..	4,500 each part.
16	Number of service reservoirs.	Four ..	One ..	One ..	Two ..	One ..	Two ..	Sixteen ..	One hundred ..	Sixty-six ..	Ten	One.. ..	Two.. ..	One.. ..	Two.. ..	One.. ..	One.. ..	Two.. ..	One.. ..	Six	Four ..	Two.
17	Size of service reservoirs.	1. 2. 1—60' dia. X 15·9' deep. 2. 3. 2—38' X 10' X 5' each. 1—60 X 13' X 8'	79·5' dia. X 30' deep.	60' dia X 15' deep	10·5' X 36' dia. at Parade 50·5' X 40' dia. at water works.	67'—9' dia. X 13'	35' dia. X 24' each	Gun Hill 1. 70' X 31½' X 13' 2. 50' X 50' X 8' Pisanee Hill 3. 51½' X 37' X 14' 4. 49' X 37' X 9' 5. 49' X 29' X 9' Sanny Hill 6. 50' X 29' X 9' Landour Hill 7. 1—14' dia. X 12' deep. Dunkhe 8. 1—14' dia. X 12' deep.	Small .. 54 Large .. 6 Small 31—9' X 9' each 39—9½' X 9' " 11—8' X 9' X 14' " 3—8' X 9' " 3—6' X 7' X 4' " 2—4' X 9' " 3—6' X 8' X 9' " 2—9' X 8' X 9' " 1—5' X 6' X 5' 1—5' X 3½' 9—1½' X 3' each 1—9½' X 9½' 1—9' X 9½' 1—9½' X 4½' 1—5½' X 9' X 4½' 1—9' X 9' X 4' 1—9½' X 3' 1—9' X 4½' 1—9½' X 4' 1—9½' X 9' 1—9½' X 9' 3—4' X 4' X 4' each Large 1—30·6' X 10' 1—17·6' X 9½' 1—9' X 13½' 1—30·12' X 9' 1—16·12' X 9' 1—52' X 10' Gun Hill 1. 12' .. 2. 9' Pisanee Hill 3. 14' 4. 9' 5. 9' Sanny Hill 6. 9' each. Landour 7. 10' each. Dunkhe 8. 12' each.	..	..	Stone-tank 9' ..	14'	9'	17—4' ..	13'	12—7'	14½'	3—10'	10'	..	1—10'—9' 3—9'—9' each..	11—9' 10—9'

APPENDIX G—(concluded)

Details of pumps, filters, tanks, reservoirs, mains, and other details of the water works in the United Provinces for 1934-35

Particulars	Agra	Allahabad	Banares	Cawnpore	Lucknow	Meerut	Muzaffarnagar	Naini Tal	Dehra Dun	Jhansi	Mirzapur	Mathura	Etawah	Hardwar	Unao	Kosi	Fatehpur-Sikri	Aligarh	Almora	Gola Gokaran Nath	Haldwani
Capacity of service reservoirs. Gallons.	(1) L. 2.—79,000 L. 2. 3—21,000 each. 1—44,500	100,000	365,000	34 gerado 321,300 34 water works 336,765.	350,000 ..	100,000 ..	(1) 210,275 (2) 50,000 (3) 240,000 (4) 67,000 (5) 60,000 (6) 73,000 (7) 6—10,000 each (8) 4—10,000 ,,	150,668 ..	Total capacity 365,300 ranging from 100 to 30,000.	1—50,000 3—100 each 7—719 ,,	1,510,000	200,000 each	120,000	350,000 each	30,000	10,000	30,000 each	200,000	1—40,000 3—2,000 each	1—10,800 3—5,000 each.	(1) 34,370 (2) 76,400
Number of public standposts.—																					
One tap—																					
(a) Cast iron spout	363	101	..	..	..	7	35	..	..	..	..	..	45	..	20	..	..	49	..	..	..
(b) W. N. cocks	122	200	138	..	501	170	19	..	2	1	135	215	22	17	6	4	18	3	1	..	2
(c) Bibcocks ..	2	114	1	101	..	..	37	193	54	2	50	2	..	8	17	8	..	1	40	1	46
(d) Push cocks ..	130	111	..	..	..	..	11	..	4	..	..	..	..	5	1	1	..	..	1	..	..
(e) Other type ..	9	16	..	..	..	..	..	..	..	..	..	4	..	25	..	12	..	..	..	..	..
Two taps—																					
(a) Cast iron spout	12	44	..	..	..	..	13	..	..	..	..	..	40	..	14	1	..	57	..	..	..
(b) W. N. cocks ..	..	..	69	..	130	..	..	..	..	..	..	46	3	63	1	6	23	1	..	6	2
(c) Bibcocks ..	..	..	..	..	..	..	..	..	41	3	..	..	..	..	..	..	..	..	14	..	3
(d) Push cocks ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..
(e) Other type ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	14	..	..	..	..	..
Three taps—																					
(a) Cast iron spout	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
(b) W. N. cocks ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
(c) Bibcocks ..	..	..	..	..	..	..	..	..	6	36	..	..	..	..	..	..	..	..	1	..	..
(d) Push cocks ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
(e) Other type ..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Four taps—																					
(a) Cast iron spout	65	43	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
(b) W. N. cocks ..	..	..	1	..	..	..	..	..	..	..	..	..	..	4	..	..	54	..	..	..	..
(c) Bibcocks ..	..	..	..	81	..	..	..	..	4	9	..	..	..	..	..	..	..	..	..	..	..
(d) Push cocks ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..
(e) Other type ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Wall Fountains ..	..	..	136	155	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Total ..	680	681	345	341	631	180	89	193	*111	46	200	267	112	121	63	68	97	105	56	9	53
Number of fire hydrants.	149	126	140	(a)345	433	104	..	19	..	..	183	9	43	10	p17	14	..	30	..	..	6
Number of coal watering posts or standpipes.	45	137	107	16	98	Swan neck 0 Cocks 64	6	..	3	..	10	9	17	9	..	..	..	..	..	3	..
Number of cattle troughs.	50	66	36	30 Fountains 4.	52	20	9	6	7	9	90	35	6	5 Garden fountains 6	..	4	..	..	9	1	4

(a) Includes 50 hydrants attached to standposts.

*Includes 66 service tanks as they are fitted with cocks for public use.

†Fitted with W. N. Cocks.

‡Includes 128 stand-pipes in bathing sheds for public use.

§Six tap standposts.

For Minerva—

Flushing tanks	5
,, pipes	17
Urinal connexion	6
Water drinking hydrant	2
Connexions to drain hand pump	1
Pail closet	3

One overhead reservoir of 1,000 gallons capacity with iron tops erected for sweepers.

APPENDIX H

Detailed estimate of expenditure incurred on Health Works under the supervision of the Superintending Engineer, Public Health Engineering Department, United Provinces, during the year 1934-35

Serial number	Name of places	Water works original and special repairs	Water works maintenance	Drainage works	Other works	Total	Remarks
		Rs.	Rs.	Rs.	Rs.	Rs.	
1	Agra	18,584	1,44,062	5,189	12,464(1)	1,80,239	(1) Including Rs 11,956 for road pavements.
2	Ajodhya	4,067	..	..	..	4,067	
3	Aligarh	..	27,835	3,035	1,238	32,108	
4	Allahabad	6,510	2,76,539	3,060	2,739	2,89,388	
5	Allahabad Magh Mela ..	12,439	..	..	9,812(2)	22,251	(2) Electric supply.
6	Almora	149	2,232	807	10,333(3)	13,521	(3) Including Rs.8,500 for construction of a vegetable market.
7	Atrauli	100	..	934	50	1,084	
8	Azamgarh	..	..	113	346	459	
9	Ballia	308	..	99	811	1,218	
10	Balrampur	43	..	110	..	153	
11	Banda	5,531(4)	..	339	8,400(5)	14,270	(4) Repairs of wells. (5) Including Rs.3,693 for road and Rs 2,607 for lighting.
12	Baraut	..	..	64	900	964	
13	Bareilly	2,231	..	11,070 11,148(6)	17,567	42,006	(6) Storm water drain in jail compound.
14	Bela (Partabgarh) ..	2,406	..	189	167	2,762	
15	Benares	6,901	2,44,765	12,308	2,818	2,66,792	
16	Bijnor	148	..	1,779	2,545(7)	4,470	(7) Including Rs.2,413 for road repairs.
17	Bisalpur	105	..	1,169	81	1,355	
18	Brindaban	140 234(8)	..	533	8,476(9)	9,438	(8) Infiltration wells. (9) Including Rs.6,433 for road and Rs.1,698 for pavements.
19	Bulandshahr ..	..	..	916	203	1,119	
20	Budaun	217	..	10,151	816	11,184	
21	Cawnpore	87,048	3,45,683	90,959	68,006	5,91,696	
22	Chandausi	1,586	..	474	57	2,117	
23	Chandpur	250	..	153	6,858	7,261	
24	Dehra Dun	16,113	10,245	25,395	1,450(10)	53,203	(10) Rs.4,437 for conservancy and Rs.1,630 for hospitals and dispensaries.
25	Dewa	10,550	..	..	..	10,550	
26	Dhampur	344	..	194	3,837(11)	4,375	(11) Including Rs.3,409 for roads.
27	Etah	..	..	319	816(12)	1,135	(12) Including Rs.800 for road repairs.
28	Etawah	6	..	441	535	982	
29	Farrukhabad ..	..	..	670	..	670	
30	Fatehpur	247	..	248	..	495	
31	Fatehpur-Sikri (Agra) ..	294	4,061	417	..	4,772	
32	Fyzabad	11,833	34,443	629	..	46,905	
33	Ghaziabad	297	..	3,811	..	4,108	
	Carried over ..	1,88,721	10,89,805	1,37,263	1,61,323	16,27,112	

APPENDIX H—(*continued*)

Detailed estimate of expenditure incurred on Health Works under the supervision of the Superintending Engineer, Public Health Engineering Department, United Provinces, during the year 1934–35

Serial number	Name of places	Water works original and special repairs	Water works maintenance	Drainage works	Other works	Total	Remarks
		Rs.	Rs.	Rs.	Rs.	Rs.	
	Brought forward ..	1,83,721	10,80,305	1,37,263	1,61,223	16,27,112	
34	Ghazipur	14	..	1,292	83	1,389	
35	Gola Gokaranath ..	275	2,980	..	..	3,255	
36	Gonda	376	..	1,969	..	2,345	
37	Gorakhpur	..	..	1,356	5,799(13)	7 155	(13) Including Rs.5,357 for road improvements.
38	Haldwani	..	4,527	1,240	4,655(14)	10,422	(14) Including Rs.4,316 for construction of a new Beef market.
39	Hardoi	799	..	846	531	2,176	
40	Hardwar	3,715	30,573	275	3,566 1,176(15) 12,594(16)	50,899	(15) Infectious diseases hospital. (16) Improvement to Har-ki-pairi.
41	Hathras	75,764	..	2,070	2,974(17)	80,808	(17) Constructing a lavatory.
42	Jaunpur	93,644	..	1,989	2,720	98,353	
43	Jhansi	10,835	23,661	701	5,544(18)	40,741	(18) Includes Rs.5179 for Infectious diseases hospital.
44	Kairana	26	..	1,692	279	1,997	
45	Kanauj	..	..	2,283	..	2,283	
46	Kasganj	..	..	3,329	..	3,329	
47	Khurja	73	..	737	7,300(19)	8,110	(19) Including Rs.5,934 for road repairs and Rs.1,105 for repairs to latrines.
48	Kosi-Kalan	..	5,103	..	..	5,103	
49	Lakhimpur-Kheri ..	110	..	873	133	1,116	
50	Lalitpur	..	..	263	629	892	
51	Lucknow	43,066	4,01,554	90,695 3,766(20)	20,024	5,59,104	(20) Anti-malarial works.
52	Meerut	4,986	35,157	10,888	1,492	52,523	
53	Mirzapur	3,061	11,470	..	376	14,907	
54	Moghal Sarai.. ..	..	..	1,210	1,702	2,912	
55	Moradabad	..	..	781	3,031(21)	3,812	(21) Including Rs.120 for construction of a burning ground and Rs.1,825 for improvement to slaughter house.
56	Mussoorie	1,524	81,490	7,250	1,112	91,376	
57	Muttra	5,671	53,171	..	..	58,842	
58	Muzaffarnagar ..	..	..	3,956	..	3,956	
59	Nagina	718	..	..	..	718	
60	Naini Tal	1,450	52,624	122	9,205	63,401	
61	Najibabad	569	..	199	514	1,282	
62	Nawabganj (Bara Banki)	..	..	467	..	467	
63	Orai	563	..	315	1,125	2,003	
64	Pilibhit	..	..	177	2,420(22)	2,597	(22) Brick pavements.
65	Rae Bareli	..	..	12	..	12	
	Carried over ..	4,95,960	17,92,115	2,28 515	2,49,307	28,05,897	

APPENDIX H—(*concluded*)

Detailed estimate of expenditure incurred on Health Works under the supervision of the Superintending Engineer, Public Health Engineering Department, United Provinces, during the year 1934-35.

Serial number	Name of places	Water-works original and special repairs	Water-works maintenance	Drainage works	Other works	Total	Remarks
		Rs.	Rs.	Rs.	Rs.	Rs.	
	Brought forward ..	4,35,960	17,92,115	3,26,515	2,49,307	28,05,897	
66	Roorkee	39	..	666	4,619(23)	5,324	(23) Includes Rs.3,623 for road metalling.
67	Saharanpur	..	..	12,569	4,252	16,821	
68	Sahaswan	97	..	272	2,630(24)	2,999	(24) Including Rs.2,539 for road work.
69	Sandila	116	..	434	33 244(25)	827	(25) Meat market.
70	Sambhal	..	..	1,201	..	1,201	
71	Shahabad	..	..	67	305	372	
72	Shahjahanpur ..	518	..	2,045	30,365(26)	32,923	(26) Including Rs 26,923 for road work and Rs.2,107 for repairs to markets and slaughter-house.
73	Sikandrabad	..	..	725	..	725	
74	Sikandra Rao ..	85	..	1,002	23	1,110	
75	Sitapur	..	..	685	..	685	
76	Sultanpur	240	..	668	402	1,310	
77	Soron	14	..	634	2,912(27)	3,560	(27) Including Rs.2,497 for road works.
78	Tanda	..	..	..	270	270	
79	Tilhar	..	..	812	618	1,430	
80	Ujhani	18	..	1,002	1,714(28)	2,734	(28) Rs.1,079 for the supply of kankar.
81	Unao	923	10,725	2,516	6,276(29)	20,440	(29) Including Rs.4,071 for road repairing and Rs.519 fixing a Persian wheel to park well.
	Total ..	4,38,010	18,02,840	3,53,813	3,03,970	28,98,633	

APPEN

Comparative statement of fuel consumption, working expenses and receipts

Serial numbers	Name of water works	Class of work, gravitation or pumping	Fuel consumed	Fuel consumption per 1,000 foot gallons	Price of fuel per ton	Total (average) lift
1	2	3	4	5	6	7
			Tons.	Lb.	Rs.	Feet.
1	Agra ..	Pumping ..	5,919·20(1)	0·04224	13·86	175·45
2	Allahabad ..	Ditto ..	(2)	..	..	245·54
3	Benares ..	Ditto ..	(3)	..	..	186·40
4	Cawnpore ..	Ditto ..	(4)	..	..	132·88
5	Lucknow ..	Ditto ..	(5)	..	..	199·36
6	Meerut ..	Turbines worked by water power.	(6)	..	..	140·38
7	Mussoorie ..	Pumping and gravitation.	..	..	..	Av. 1,396·13
8	Naini Tal ..	Ditto ..	(7)	..	..	Av. 527·51
9	Debra Dun ..	Gravitation ..	..	..	..	Gravitation
10	Jhansi ..	Pumping ..	671·20(8)	0·09046	13·41	220·73
11	Mirzapur ..	Gravitation ..	..	..	..	Gravitation
12	Muttra ..	Pumping ..	(9)	..	..	Av. 168·51
13	Fyzabad ..	Ditto ..	20·53 (10)	0·00890	80·46	Av. 121·42
14	Hardwar ..	Ditto ..	..	..	..	176·60
15	Unao ..	Ditto ..	32·09 (11)	0·01039	107·93	135·33
16	Kosi ..	Ditto ..	8·93 (12)	0·00757	110·75	111·16
17	Fatehpur Sikri	Ditto ..	6·78 (13)	0·00496	118·29	206·07
18	Aligarh ..	Ditto ..	..	..	..	147·05
19	Almora ..	Gravitation ..	..	..	..	Gravitation
20	Golagokaran Nath.	Pumping ..	3·74 (14)	0·02245	127·74	72·05
21	Haldwani ..	Gravitation ..	..	..	..	Gravitation

(1) Coal 3,594·96 tons, fuel oil 55·17 tons and electrical charges Rs.19,793 (Rs.16,210 for Raw converted into coal and fuel oil 1,426·07 tons. Coal consumption includes 72·46 tons for municipal
(2) Pumping done by electric motors. Coal consumed 47·00 tons (15·00 tons for pumping Daragan) Tube-well.
(3) Pumping done by electric motors. Coal consumed 717·57 tons (132·45 tons for workshop,
(4) Pumping done by electric motors. Coal consumed 231·25 tons (145·35 tons for pumping
(5) Pumping done by electric motors. Coal consumed 19·46 tons (16·46 tons for workshop
(6) Pumping done by turbines. Wood consumed 2·00 tons for other purposes.
(7) Pumping done by electric motors. Coal consumed 22·00 maunds for other purposes.
(8) Includes 28·75 tons of coal for municipal purposes and 22·30 tons for shortage.
(9) Pumping done by electric motors. Fuel oil consumed 0·70 tons for pumping water by
(10) Includes 0·71 tons of fuel oil for municipal purposes and 0·02 tons for shortage.
(11) ,, 1·29 tons kerosine oil.
(12) ,, 0·43 tons kerosine oil and 0·14 tons shortage.
(13) ,, 0·49 tons kerosine oil and 0·02 tons shortage.
(14) ,, 0·48 tons kerosine oil.

DIX I

of various water works in the United Provinces during the year 1934–35

Percentage of charges for—					For 1,000 gallons		For head per annum			
Establishment	Fuel	Oil and waste	Repairs to machinery	Other charges	Total working cost	Total receipt	Total working cost	Total receipt	Profit or loss.	Remarks
8	9	10	11	12	13	14	15	16	17	18
					As.	As.	As.	As.	As.	
42·66	36·80	1·90	3·36	15·28	2·18	3·24	14·38	21·37	6·99	Profit.
28·29	56·47	0·66	1·62	12·96	3·22	3·82	36·16	42·86	6·70	,,
28·64	57·24	0·45	2·20	11·37	2·03	2·24	25·94	28·62	2·68	,,
31·47	33·57	0·43	0·57	33·96	1·92	3·43	24·96	44·49	19·53	,,
26·63	52·21	0·26	1·40	19·50	2·73	3·14	40·31	46·41	6·10	,,
50·03	..	1·10	2·10	46·77	1·04	1·20	6·17	7·12	0·95	,,
21·85	61·28	6·16	0·57	10·14	15·76	12·21	150·25	116·43	33·82	Deficit.
17·41	73·56	0·80	1·40	6·83	18·63	23·74	84·61	107·80	23·19	Profit.
78·93	..	..	..	21·07	3·36	2·71	9·15	7·38	1·77	Deficit.
15·50	41·46	1·14	4·78	37·12	5·03	5·64	9·40	10·54	1·14	Profit.
69·64	..	..	..	30·36	0·53	2·21	4·30	17·82	13·52	,,
27·14	69·85	0·51	0·15	2·35	4·17	5·01	19·25	23·10	3·85	,,
57·82	23·13	6·43	6·29	6·33	3·86	3·91	20·97	21·24	0·27	,,
28·02	65·36	0·22	1·33	4·17	6·58	8·53	58·25	75·45	17·20	,,
33·84	34·08	18·90	0·99	12·19	3·52	2·82	14·33	11·97	2·36	Deficit.
53·77	18·85	16·17	3·10	8·11	3·43	5·53	11·19	18·20	7·01	Profit.
51·36	18·15	12·26	6·50	11·23	4·37	2·70	10·56	6·52	4·04	Deficit.
21·40	71·42	0·08	3·18	3·92	4·35	2·62	12·72	7·68	5·06	,,
60·13	..	..	..	39·87	4·31	0·22	16·36	0·84	15·52	,,
65·30	12·52	4·97	0·13	17·08	12·57	0·84	9·23	0·61	8·62	,,
47·96	..	0·11	..	51·93	0·87	0·67	6·41	4·91	1·50	,,

water, Rs.1,590 for Maithan and Chili Int and Rs.1,993 for Rikabganj and Fort Boosting sets)
purposes.
water by steam engines and 32·00 tons for Municipal purposes). 14·75 tons fuel oil consumed at

etc. and 535·12 tons for Municipal purposes).
water by steam engines and workshop, etc. and 85·90 tons for municipal purposes).
etc. and 3·00 tons for municipal purposes).

Diesel sets.

APPEN

Statement showing initial capital cost, details of income and expenditu

Serial numbers	Particulars	Agra	Allahabad	Benares	Cawnpore	Lucknow	Meerut	Mussoorie	Naini Tal
1	Description of plant ..	Oil Engine, Steam Power and Electric Motors	Steam Power, Oil Engine and Electric Motors	Steam Power and Electric Motors	Steam Power and Electric Motors	Electric Motors	Water Turbines and Steam Power	Gravitation and Electric Motors	Gravitation and Electric Motors
2	Initial capital cost in Rupees lakhs.	11·71	16·24	25·62	14·45	15·16	7·52	4·80	2·47
3	Total cost of works in lakhs. ,,	36·25	45·69	44·61	37·75	66·48	8·43	12·98	10·61
4	Number of inhabitants drawing their supply from mains.	229,764	183,914	205,315	243,755	218,000	91,181	13,057	14,791
5	Hours of supply daily ..	9·78	15·00	9·76	16·00	17·00	19·94	24·00	24·00
6	Quantity supplied during year in millions. Gallons.	1,516·860	2,065·580	2,623·377	3,162·370	3,217·530	539·238	124·470	67·170
7	Total water horse power hours per annum in millions.	1·34	2·56	2·47	2·12	3·24	0·38	0·88	0·18
8	Maximum daily average during any one month in millions. Gallons	5·233	6·667	7·412	10·355	11·146	1·609	0·494	0·289
9	Average daily supply for the year in millions. ,,	4·156	5·659	7·189	8·664	8·815	1·477	0·341	0·184
10	Maximum supply per head per day. ,,	22·78	36·25	36·10	42·48	51·13	17·65	37·83	19·54
11	Average supply per head per day. ,,	18·09	30·77	35·01	35·54	40·44	16·20	26·12	12·44
12	Total lift (average) .. Feet	175·45	245·54	186·49	132·83	199·36	140·38	Av.1,396·13	Av.527·51
13	Quantity supplied during the year in millions. Foot gallons	266,183	507,183	489,327	420,058	641,447	75,698	173,776	35,433
14	Fuel consumed .. Tons	(a)5,018·20	..	..	..	..	..	..	..
15	Fuel consumption per million foot gallons. Lb	42·24	..	..	..	..	..	..	..
16	Cost of fuel per ton .. Rupees	13·86	..	..	..	..	..	..	..
17	Cost of establishment per million foot gallons. Annas	3·69	2·47	2·29	4·14	2·67	3·72	1·64	4·14
18	Cost of fuel or electric energy per million foot gallons. ,,	3·19	4·92	4·59	4·22	5·39	..	4·60	17·43
19	Cost of oil and waste per million foot gallons. ,,	0·17	0·06	0·03	0·05	0·08	0·08	0·46	0·19
20	Cost of repairs to machinery per million foot gallons. ,,	0·29	0·14	0·18	0·08	0·14	0·16	0·04	0·33
21	Cost of other charges per million foot gallons. ,,	1·32	1·13	0·91	4·47	1·95	3·47	0·76	1·62
22	Total charges per million foot gallons. ,,	8·66	8·72	8·00	13·17	10·02	7·43	7·50	23·76
23	Maintenance charges per thousand gallons supplied ,,	1·52	2·14	1·49	1·75	2·00	1·04	10·47	12·53
24	Interest and sinking fund charges per thousand gallons supplied. ,,	0·66	1·08	0·54	0·17	0·73	..	5·29	6·10
25	Total (maintenance and interest and sinking fund per thousand gallons supplied) ,,	2·18	3·22	2·03	1·92	2·73	1·04	15·76	18·63
26	Maintenance charges in thousands. Rupees	144·00	276·54	244·77	345·68	401·55	35·16	81·49	52·62
27	Interest and sinking fund charges in thousands. ,,	62·40	139·05	88·09	34·52	147·05	..	41·12	25·59
28	Total income in thousands. ,,	306·94	492·63	367·24	677·78	632·34	40·60	95·01	99·65
29	Profit or loss on maintenance in thousands. ,,	+162·94	+216·00	+122·47	+332·10	+230·79	+5·44	+13·52	+47·03
30	Profit or loss on maintenance and interest and sinking fund in thousands. ,,	+100·45	+77·04	+34·38	+297·68	+83·14	+5·44	-27·60	+21·44
31	Profit or loss percentage on total cost of works.	+2·77	+1·69	+0·77	+7·88	+1·25	+0·65	-2·13	+2·02

(a) Coal, fuel oil electrical energy converted into coal and fuel oil.
(b) Coal.
(c) Fuel oil.

DIX J

for water works in the United Provinces for the year 1934-35

Dehra Dun	Jhansi	Mirzapur	Muttra	Fyzabad	Hardwar	Unao	Kosi	Fatehpur-Sikri	Aligarh	Almora	Gokarn-Naran Nath	Haldwani
Gravitation	Steam Power	Gravitation	Oil Engine and Electric Motors	Oil Engines and Electric Motors	Electric Motors	Oil Engines	Oil Engine	Oil Engine	Electric Motors	Gravitation	Oil Engines	Gravitation
0·97	0·97	5·98	5·17	9·49	1·97	1·10	0·70	0·52	5·71	1·74	0·93	1·10
5·37	2·34	7·47	6·75	10·54	5·19	1·95	0·77	0·68	5·94	1·75	1·00	1·16
40,409	40,255	42,700	59,441	35,000	11,535	13,000	7,294	6,152	35,600	8,715	5,164	11,288
24·00	10·23	16·36	7·70	8·25	14·00	10·00	10·00	6·66	3·80	24·00	3·72	24·00
110·000	75·297	344·812	274·177	189·893	102·088	55·224	23·770	14·882	102·236	33·113	3·794	33·201
..	0·08	..	0·23	0·12	0·09	0·03	0·01	0·02	0·07	..	0·001	..
0·435	0·280	1·236	0·947	0·565	0·388	0·200	0·083	0·053	0·854	..	0·016	..
0·301	0·206	0·945	0·751	0·520	0·280	0·151	0·065	0·041	0·280	0·091	0·010	0·228
10·76	6·96	28·95	15·93	16·14	33·64	15·38	11·38	8·62	10·11	..	3·10	..
7·46	5·12	22·12	12·64	14·86	24·25	11·64	8·93	6·63	8·01	10·41	2·01	20·19
Gravity supply	220·73	Gravity supply.	Av. 168·51	Av. 121·42	176·00	125·33	111·16	206·07	147·05	Gravity supply.	72·05	Gravity supply.
..	16,620	..	46,202	23,057	17,967	6,921	2,642	3,067	15,041	..	273	..
..	(b)671·20	..	..	(a)90·53	..	(c)32·09	(c) 8·93	(c)6·73	..	..	(c)2·74	..
..	90·46	..	..	8·80	..	10·39	7·57	4·95	..	..	22·45	..
..	13·41	..	..	80·46	..	107·92	110·75	118·29	..	..	127·74	..
..	3·53	..	5·00	13·82	7·87	8·39	16·62	10·99	6·34	..	114·05	..
..	9·44	..	12·86	5·53	17·30	8·45	5·82	3·84	21·15	..	21·86	..
..	0·26	..	0·09	1·54	0·06	4·69	5·00	2·60	0·02	..	8·67	..
..	1·09	..	0·03	1·50	0·36	0·24	0·95	1·38	0·94	..	0·24	..
..	8·46	..	0·43	1·51	1·14	3·02	2·51	2·38	1.16	..	20·83	..
..	22·78	..	18·41	23·90	27·23	24·79	30·99	21·19	29·61	..	174·65	..
1·49	5·03	0·53	3·10	2·90	4·79	3·11	3·43	4·37	4·35	1·03	12·17	0·87
1·87	..	..	1·07	0·96	1·79	0·41	..	..	..	3·23	..	..
3·36	5·03	0·53	4·17	3·86	6·58	3·52	3·43	4·37	4·35	4·31	12·57	0·87
10·25	23·66	11·47	53·17	34·44	30·57	10·72	5·10	4·06	27·39	2·23	2·98	4·53
12·87	..	..	18·35	11·43	11·43	1·41	..	..	..	6·68	..	..
13·64	26·52	47·55	95·82	46·46	54·40	9·73	8·80	2·51	16·76	0·46	0·20	3·47
+8·39	+2·86	+36·05	+32·65	+13·02	+23·83	−0·99	+3·20	−1·55	−11·07	−1·77	−2·78	−1·06
−4·48	+2·86	+36·08	+14·30	+0·59	+12·40	−2·40	+3·20	−1·55	−11·07	−3·45	−2·73	−1·06
−0·83	+1·22	+4·33	+2·12	+0·06	+2·39	−1·24	+4·15	−2·28	−1·89	−4·83	−2·54	−0·91

APPENDIX K

Hydro-Electric Supply

1934-35

Particulars	Mussoorie	Naini Tal
1. Total units generated	3,072,782 *227,274	1,133,133
2. Maximum units for any one day	13,259 *10,300	4,582
3. Average load K. W.	429·31 *192·76	135
4. Power Factor—		
Maximum	0·95	0·93
Minimum	0·75	0·90
5. Load Factor—		
Maximum (monthly)		
Average	0·42 *0·03	0·23
Minimum (monthly)		
6. Generating Volts—		
Maximum	7,000	3,500
Minimum	6,600	3,500
7. Total hours of running	8,555 *1,179	8,742·92
8. Total cubic feet of water used	220,366,920	43,826,050
9. Maximum quantity used in any month, cubic feet	22,120,400	4,416,640
10. Minimum quantity used in any month, cubic feet	14,207,400	3,092,800
11. Average rate of discharge, cubic feet per diem	603,745	120,071
12. Maximum rate of discharge of pipe line—		
No. 1, cubic feet per second	8·30	Both the lines worked together.
No. 2, cubic feet per second	8·30	
13. Minimum rate of discharge of pipe line—		
No. 1, cubic feet per second	7·30	
No. 2, cubic feet per second	7·30	
14. Average intake level	4,491	8·80
15. Maximum intake level		11·90
16. Minimum intake level		5·70
17. Total rainfall for the year, inches	93·50	121·33
18. Total cubic feet allowed to pass through the lake sluice overflow intake weir (million cubic feet) (Naini Tal only).	..	209·21
19. Maximum recorded rain fall for 24 hours, inches	5·80	10·90

*Diesel sets.

APPENDIX L

ELECTRIC SUPPLY

1934-35

Particulars	Hardwar
1. Total units received	472,014
2. Maximum units for any one day	3,635
3. Average load K. W.	98
4. Power Factor—	
Maximum	0·95
Minimum	0·93
5. Load Factor—	
Maximum (monthly)	Nil
Average	Nil
Minimum (monthly)	Nil
6. Receiving Volts—	
Maximum	400
Minimum	380

APPENDIX M

Statement showing electric energy consumed, rate charged and revenue derived

1934-35

Particulars	Mussoorie			Naini Tal			Hardwar		
	Units	Rate	Rs.	Units	Rate	Rs.	Units	Rate	Rs.
1. For Municipal purposes—									
Public lighting ..	216,736	Two annas ..	25,352	148,003	Lump sum ..	21,000	64,200	Three annas and seven pies.	14,378
	*202,901	Ditto ..	*25,007						
Water supply pumping ..	782,968	One anna	48,956	187,570	Three annas ..	35,244	153,387	Two annas ..	19,081
Other purposes ..	509,910	..	18,591	†161,641	Different rates ..	17,741	5,061	Three annas and seven pies.	1,445
2. Sold by meter—									
Lighting	252,554	Eight annas ..	1,04,466	289,750	Eight annas ..	92,458	(a)57,728	Six annas	22,164
	*384,700	Ditto ..	*1,62,149				(b)34,750	Four annas ..	8,716
Heating	113,384	Two annas ..	7,412	106,560	One anna and four pies	6,841	..	..	..
	*526,096	Ditto ..	*38,241						
Power	..	..	..	15,474	Two annas and eight pies.	1,071	111,992	One anna and six pies	10,311
3. Recoveries on rated premises.	Included in item 2 lighting		..	37,900	Rupees two per lamp per mensem.	6,775	19,450	..	3,714
4. Other receipts.. ..	..	..	11,310	272	..	3,371	..	..	1,190
5. Meter rent and miscellaneous.	..	..	7,648 *18,000	..	..	7,727	..	..	1,940
6. Total units sold and receipts	2,939,240	..	4,57,362	‡878,236	..	1,82,228	447,034	..	83,848

*For Dehra Dun.
†Includes 133,181 units free supply.
‡Includes Rs.3,408 debited to water works for light, etc.
(a) Private.
(b) Railway.

APPENDIX N

Statement showing number of electric connexions

1934-35

Particulars	Mussoorie		Naini Tal		Hardwar	
	Number	K. W.	Number	K. W.	Number	K. W.
1. Private connexions at close of preceding year.	2,007 3,714*	..	1,716	..	601	..
2. Connexions made during the year ..	203 173*	..	66	..	3	..
3. Metered connexions existing on March 31, 1935.	1,873 1,961*	..	1,000	..	353	..
4. Municipal lamps existing on March 31, 1935.	(a) 956 (b) 1,036*	..	566	..	597	..
5. Heating points connected on March 31, 1935.	497 359*	..	430	..	..	..
6. Total K. W. connected on March 31, 1935.	..	4,230	..	1,846·52	..	409
7. Peak load for the year	..	H. E. 880 Diesel 519	..	380	..	162
8. Diversity factor per cent. ..	..	45	..	20·52	..	..

* For Dehra Dun.

(a) Civil area 896, Cantonment 60.

(b) Civil area 833, Cantonment 203.

APPENDIX O

HYDRO-ELECTRIC SUPPLY

Annual maintenance account

1934-35

Item numbers	Particular of charges	Mussoorie	Naini Tal
		Rs.	Rs.
I	*Establishment—*		
	(a) Engineers	30,489	11,039
	(b) Mechanics and drivers	16,802	5,861
	(c) Workshop	2,651	Nil
	(d) Distribution	23,024	6,467
	(e) Clerical staff	22,276	2,740
	(f) Menial staff	3,164	1,500
	(g) Office contingencies	9,943	3,135
	(h) Cost of collecting electric revenue and services rendered by other departments.	..	1,500
	(i) Rent	1,800	475
II	Supplies—oil, waste and petty stores	15,828	1,479
III	*Repairs—*		
	(a) Machinery	4,327	1,431
	(b) Pipe line	828	113
	(c) Overhead line	20,225	6,699
	(d) Buildings	675	128
IV	*Miscellaneous—*		
	(a) Supply to staff quarters and office	Nil	Nil
	(b) Other charges	5,870	310
V	Total maintenance..	1,57,902	43,037
VI	Credit to municipal water supply for water	Nil	Nil
VII	Repayment of loan charges (with interest)	2,00,541	1,10,417
VIII	Total annual charges	3,58,443	1,53,444
IX	Total receipt during the year	4,57,862	1,82,228
X	Profit during the year	99,419	28,784
XI	Total units generated	3,900,056	1,183,183
XII	Total units sold	2,989,249	898,236
XIII	Total loss in transmission and transformers, etc.. ..	910,807	284,942
XIV	Cost per unit generated Annas ..	1·47	2·07
XV	Cost per unit sold .. .. " ..	1·92	2·73

APPENDIX P

Electric Supply

Annual maintenance Account.

1934-35

Item numbers.	Particulars of charges	Hardwar
		Rs.
I	*Establishment—*	
	(*a*) Engineers	8,649
	(*b*) Mechanics and drivers	955
	(*c*) Workshop	..
	(*d*) Distribution	3,373
	(*e*) Clerical staff	1,288
	(*f*) Menial staff	144
	(*g*) Office contingencies	144
	(*h*) Cost of collecting electric revenue and services rendered by other departments	..
	(*i*) Rent	60
II	Supplies—oil, waste and petty stores	..
III	*Repairs—*	
	(*a*) Machinery	..
	(*b*) Overhead lines including cost of bulbs	2,085
	(*c*) Buildings	92
IV	Cost of electric energy purchased during the year from Irrigation Department	52,133
V	*Miscellaneous—*	
	(*a*) Supply to staff quarters and office	..
	(*b*) Other charges	949
VI	Total maintenance	64,117
VII	Repayment of loan charges (with interest)	14,752
VIII	Total annual charges	78,869
IX	Total receipt during the year	83,848
X	Profit during the year	4,979
XI	Total units purchased	472,014
XII	Total units sold	447,934
XIII	Total loss in transmission and transformers, etc.	24,080
XIV	Cost per unit purchased	2·67
XV	Cost per unit sold	2·82

APPENDIX Q.

A.—List of projects finally sanctioned during the year 1934-35

I—Provincial

(a) *Fair projects*—

		Rs.
1.	Allahabad Magh Mela water supply. Repairs and maintenance of pumping plant and temporary shed	825
2.	Allahabad Magh Mela water supply and maintenance for 1934-35 ..	13,693
3	Allahabad Magh Mela electric supply for 1934-35	11,370
4	Brindaban water supply. Ascertaining the nature of strata in connection with the construction of fair infiltration wells	500
5.	Lucknow anti malarial works Ghaziuddin Hyder Canal. Improving tube-well yield	580
6.	Lucknow anti-malarial and drainage works Ghaziuddin Hyder Canal maintenance 1934-35	6,817
7.	Lucknow anti malarial and drainage works Ghaziuddin Hyder Canal revised 1934-35	6,978
8.	Lucknow, spare parts for the tube-well Ghaziuddin Hyder Canal ..	645
9.	Lucknow Gomti weir maintenance	1,791
	Total	43,139

I(a) Provincial Allahabad district, Public Works Department works

1.	Allahabad Magh Mela river training work for 1933-34	1,500
2.	Allahabad Annual repairs and maintenance of provincial roads revised estimate for 1933-34	83,174
3.	Allahabad annual repairs maintenance to accommodation for travellers..	85
4.	Allahabad Fixing new chain and belt for pump in the residence of Executive Engineer, Provincial Division	398
5.	Allahabad Additions and alterations Secretary's residence set no. 1 ..	758
6.	Allahabad Improving the accoustics in room no. 6, New High Court ..	4,173
7.	Allahabad maintenance of Bakshi, Beni and Jamna bunds ..	450
8.	Allahabad Providing two light points in the Board of Revenue Office ..	32
9.	Allahabad Maintenance of Alfred Park Pumping station	9,000
10.	Allahabad Annual repairs to clerks' quarters, 1933-34	1,043
11.	Allahabad Maintenance of Rasulabad Distillery 1933-34 (revised estimate)	2,300
12.	Allahabad Additions and alterations Secretary's residence set no. 1 ..	1,004
13.	Allahabad Special repairs to earthquake damages	32,699
14.	Allahabad Maintenance of pontoon bridges	26,000
15.	Allahabad Maintenance of Ganges navigation works	1,120
16.	Allahabad Constructing an office building in the civil Aerodrome, Bamrauli	14,231
17.	Allahabad Maintenance of pumping plant Rasulabad for 1934-35 ..	2,100
18.	Allahabad Annual repairs to endowed tombs	1,374
19.	Allahabad Additions and alterations to electric installation. Secretary's residence	180
20.	Allahabad Maintenance of arboriculture	2,672
21.	Allahabad Annual repairs to Provincial roads 1934-35	86,313
22.	Allahabad Annual repairs to latrins Assistant Engineer's residence, Beli Road	68
23.	Allahabad Boring a 4" tube in a well in the Aerodrome	316
24.	Allahabad Levelling of Aerodrome ground	67
25.	Allahabad Annual repairs to New High Court	4,530
26.	Allahabad Annual repairs to Government Press..	1,309
27.	Allahabad Annual repairs to old office Superintending Engineer, Public Health Department and Consulting Architect	1,430
28.	Allahabad Annual repairs to Board of Revenue office	1,102
29.	Allahabad Annual repairs to Accountant-General's office	1,044
30.	Allahabad Annual repairs to Departmental offices	2,055
31.	Allahabad Annual repairs to Secretariat offices	4,178
32.	Allahabad Maintenance of sewerage and drainage public offices ..	175
33.	Allahabad Proposed racks and cages in High Court	941
34.	Allahabad Providing electric table lamp in clerks' quarters	14
35.	Allahabad Maintenance of electric installation in Government buildings	5,379
36.	Allahabad Annual repairs to Government House	8,906
37.	Allahabad Erection, maintenance and dismantling of a pile bridge in Magh Mela	1,828
38.	Allahabad Maintenance of electric installation to Government House ..	1,952
39.	Allahabad Quadrennial repairs to Assistant Engineer's residence Beli Road	55
40.	Allahabad. Water tax to residential buildings	1,280
41.	Allahabad Constructing office in civil Aerodrome supplementary estimate	1,284
42.	Allahabad List of annual repairs estimates below Rs.1,000	5,446
43.	Allahabad Monsoon damage repairs to Mansaita nala bridge	1,500
44.	Allahabad Repairs and carriage of tools and plant	1,456
	Total ..	3,19,577

(b) *Preliminary proposal*—

Nil

(c) *Forecast of cost*—

1.	Allahabad Magh Mela fire protection arrangements	6,090
2.	Allahabad Naini Central Jail sinking 4" pipe in 4 masonry wells ..	3,252
3.	Meerut District Jail water supply	4,700
	Total ..	14,042

APPENDIX Q—(continued).

I(c) *Provincial Allahabad Public Works Department Works*—

1.	Additions and alteration to Government Press	3,434
	Total ..	3,434

II—Deposit Works

(a) *Fair projects*—

1.	Agra water supply metering connection in low lying areas	43,000
2.	Allahabad Civil Lines, Two tube-wells in (revised estimate) ..	40,977
3.	Budaun Drainage extension	48,743
4.	Dehra Dun extension of sewage farm	10,166
5.	Deoria Drainage	23,435
6.	Fyzabad water supply. Tube-well near existing tube-well no. 3 (revised estimate)	12,330
7.	Ghazipur Water supply extension trial tube well (revised estimate) ..	12,069
8.	Gorakhpur Drainage extension	38,752
9.	Hardwar union Water supply extension constructing a 4th tube-well with pumping plant (revised)	54,733
10.	Hardwar Water supply providing a chlorinating plant at Fibri Reservoir	17,375
11.	Hardwar Water supply extension 4th tube-well at Mayapur (second) revised estimate	12,841
12.	Hardwar Improvement to Har-ki-pairi (revised estimate of sub-head R. C. Bridge at Jammu Ghat)	22,711
13.	Hathras Water supply 2nd revised estimate	3,89,726
14.	Lucknow Anti-malaria and drainage inlet connection and Mawaiya sewer and Dariba drains	557
15.	Lucknow anti malaria and drainage new inlets	4,495
16.	Muttra Infectious Diseases Hospital. Reconstructing the dispensary block	5,816
17.	Muttra Infectious Diseases Hospital supplementary estimate ..	2,000
	Total ..	7,43,818

(b) *Preliminary proposals*—

Nil

(c) *Forecast of cost*—

1.	Agra water supply chemical feed apparatus for the application of alumina to the raw water	8,000
2.	Agra drainage improvement of Peepal Mandi Nala	2,000
3.	Brindaban water supply. Proposed chain of four infiltration wells for ascertaining the yield, of sub-soil water along the river	19,700
4.	Fyzabad water supply extension of distribution	21,038
5.	Hapur water supply	2,22,000
6.	Jaunpur Drainage improvements	40,651
7.	Kasganj Drainage	43,000
8.	Orai water supply	83,250
	Total ..	4,40,039

B—*List of projects submitted but not sanctioned during the year* 1934-35

I—Provincial Works

(a) *Fair projects*—

		Rs.
1.	Allahabad, Naini Central Jail water supply constructing four 5" strainerless tube-wells	3,150
2.	Allahabad, Naini Central Jail, water supply constructing an 8" tube-well	10,750
3.	Bahraich, Syed Salar Fair water supply tube-well	8,258
4.	Lucknow, Ghazi-ud-din Hyder Canal tube-well. Supplying and fixing a vacuum pumps set for	1,103
5.	Lucknow. Maintenance of Gomti weir for 1935-36	1,701
6.	Lucknow. Maintenance of Ghazi-ud-din Hyder Canal for 1935-36 ..	3,000
	Total ..	28,852

I(a)—*Provincial Allahabad District, Public Works Department works*

1.	Providing a door in the coach house Secretariat clerks' quarters ..	125
2.	Additions and alterations to menials latrine Secretariat clerks' quarters	27
3.	Providing four pendant lights in Accountant General's office at Allahabad	67
4.	Providing a door in the Administrator General's office, High Court ..	93
5.	Additional light in the judgment-writer's room, High Court ..	36
6.	Proposed galleries in Accountant-General's office	626
7.	Fire damage repairs to Mayo Hall	12,313
8.	Survey estimate of Provincial Roads	1,365
9.	Providing a partition in the decree holders' room, High Court ..	342
	Total ..	15,013

(b) *Preliminary proposals*—

Nil

(c) *Forecasts of costs*—

1.	Agra Lady Lyall Hospital, water supply test boring	1,500
2.	Allahabad, Naini Central Jail, water supply—	
	First	9,080
	Second	31,700
3.	Bahraich, Syed Salar fair water supply	15,000
4.	Bareilly, Juvenile Jail 3" tube-well	927
5.	Lalganj (Azamgarh), small tube-well	1,000
6.	Lalganj installation of a hand pump and repairs to old pump ..	250
7.	Salsoon (Etawah), improvement of well in police station	2,000
	Total ..	32,533

APPENDIX C—(*continued*)

I(c)—Provincial Allahabad District, Public Works Department works

		Rs.
1.	Road construction programme—	
	First	1,95,032
	Second	54,632
	Total ..	2,49,664

II—DEPOSIT WORKS

(*a*) *Fair projects*—

1.	Bareilly anti-malarial works improvements	151
2.	Bindki (Fatehpur), town survey	850
3.	Dehra Dun water supply, Bandel extension	5,54,982
4.	Ghazipur water supply	3,06,588
5.	Ghazipur water supply, tube-well no. 2	12,091
6.	Hardwar water supply, extension cleaning and developing 4th tube-well at Mayapur	2,704
7.	Hardwar town planning of Bhopatwala Training Bagh Rao	98,158
8.	Hardwar, drainage I instalment (revised)	5,57,579
9.	Jhansi, drainage survey	5,000
10.	Kosi Kalan drainage	78,896
11.	Moghal Sarai, water supply. Trial tube-well	7,726
	Total ..	16,24,725

(*b*) *Preliminary proposals*—

Nil.

(*c*) *Forecast of cost*—

1.	Agra water supply to mental hospital—	
	Alternative (*a*)	26,500
	Do. (*b*)	58,400
2.	Allahabad water supply metering scheme	5,200
3.	Almora water supply Improvement—	
	First Instalment	21,837
	Second ,, ...	1,27,079
	Third ,, ...	44,048
	Fourth ,, ...	55,836
4.	Bijnor 20 seated latrine	5,900
5.	Gola Gokarannath tank water supply and drainage improvement ..	23,841
6.	Hardwar Drainage	73,413
7.	Moradabad Infectious Diseases Hospital	40,200
8.	Partabgarh water supply	70,000
	Total ..	5,52,254

C—List of projects under preparation with the approximate estimated amount

(*a*) *Fair projects*—

		Rs.
1.	Allahabad, Adh-Kumbh Mela, water supply	50,000
2.	Type design of hide curing and training godowns	25,000
	Total ..	75,000

(*b*) *Preliminary proposals*—

Nil.

(*c*) *Forecast of cost*—

Nil.

II—DEPOSIT WORKS

(*a*) *Fair projects*—

1.	Ajodhya water supply. Two tube-wells (revised estimate)	23,000
2.	Allahabad Two tube-wells, pump house and pumping plant, etc. ..	72,000
3.	Bahraich, water supply modification	1,50,000
4.	Benares drainage extension	3,50,000
5.	Cawnpore drainage part VI	2,25,941
6.	Etawah water supply	1,50,000
7.	Fyzabad water supply. A tube-well near the existing tube-well, no. 3, second revised estimate	15,184
8.	Hardoi drainage	83,000
9.	Hardwar sewage farm	61,000
10.	Moghal Sarai water supply	35,000
	Total ..	11,70,125

(*b*) *Preliminary proposals*—

Nil.

(*c*) *Forecast of cost*—

1.	Allahabad, water supply fourth pumping set at Khusrobagh ..	18,000
2.	Allahabad infectious diseases Hospital	80,000
3.	Bahraich drainage improvement	70,000
4.	Bijnor drainage	Not known.
5.	Benares Udai Pratap College, drainage	40,000
6.	Unao—Stevensonganj drainage	35,000
	Total ..	2,43,000

APPENDIX Q—(*concluded*)

LIST OF WORK DELAYED FOR WANT OF STAFF

		Rs.
1.	Ajodhya water supply. Two tube-wells (revised)	28,000
2.	Allahabad, Civil Lines. Two tube-wells :—Pump-house and pumping plant	72,000
3.	Allahabad water supply. Alum dosing plant	
4.	Allahabad drainage improvement.	
5.	Bahraich water supply modification	1,50,000
6.	Brindaban water supply (revised)	
7.	Etawah water supply	1,50,000
8.	Mirzapur water supply, filtration plant.	
9.	Muzaffarnagar drainage.	
10.	Naini Tal water supply-softening plant.	
11.	Sultanpur drainage.	
12.	Type design of hide curing and tanning godown.	

Forecast of cost—

13. Bijnor drainage.
14. Hathras drainage.
15. Khurja drainage. Improvement and extension.
16. Sarai Aqil police station.

Completion report—

Bareilly anti-malarial works.
Chirgaon drainage.
Fyzabad water supply extension.
Gorakhpur drainage.
Kaimganj drainage.
Lucknow overflow jail, water supply.
Lucknow, Government House unfiltered water supply.
Lucknow, Gazi-ud-din Hyder Canal drainage works.
Lucknow sewage, pumping station.
Muttra water supply extension Tube well no. 5.
Unao drainage.
Drainage of lavatories and sanitary fittings in Secretariat buildings.

APPENDIX R

Revenue derived from sewage farms during the year 1934-35

Serial number	Particulars	Agra	Allahabad	Dehra Dun	Lucknow	Muttra	Kanauj	Mussoorie
1	Area under cultivation in acres	108	254	4·19	(2)685·62	64·04	3·8	6·700
2	Total rent demanded from cultivators.	10,217	24,205	1,025	9,450	(5)7,711·4	100	350
3	Average rent per acre per annum.	95	95·29	244·6	69	121·4	26·3	52·17
4	Quantity of sewage treated in million gallons.	Not available.	(1)774·064	1·227	Not supplied for want of meter.	6·9834	Not known	Not available.
5	Average quantity of sewage consumed per acre per diem in gallons.	Do.	77·90	802	Do.	3,973	Do.	Do.
6	Expenditure incurred on the maintenance of the farm.	216	2,020	..	(3)3,334	6·194	5	..
7	Revenue derived .. Rs.	5,533	20,201	1,025	13,203	7,775	101	350
8	Profit .. ,,	5,317	18,181	1,025	(4)9,870	1,517	96	350
9	Loss .. .. ,,	..	..	..	..	..	..	..

(1) Municipal farms 772,261,000 gallons and agricultural institute 51,803,000 gallons.

(2) On this only 290 acres treated with sewage.

(3) This sum does not include Rs.4,078 spent in connexion with the extension of main sullage carrier in sullage farm, Rs.3,202 incurred on the extension of sullage drain and Rs.14,100 paid towards the interest and sinking fund on loans taken for the sewage farm.

(4) If the amount spent towards the extensions carried out and that paid towards the interest and sinking fund there would be a loss of Rs.11,451. It also does not include Rs.5,208 on account of repayment of interest and sinking fund on loan taken for pumping station scheme and Rs.20,875 for the electric current.

(5) Rupees 163 part of arrears for 1934-35 realized in April, 1935.

APPENDIX S

Statement of expenditure on construction works carried out by the Engineering Branch of the Public Health Department during 1934-35

Serial number	Name of works	Estimated cost	Total expenditure up to the end of March, 1934	Expenditure incurred during the year
	I—PROVINCIAL			
	(a) *Public Health Engineering Department Works*	Rs.	Rs.	Rs.
1	Allahabad Magh Mela—Water Supply and Maintenance of pumping plant, 1934-35.	825	..	705
2	Allahabad Magh Mela—Water Supply, 1934-35 ..	12,978	..	12,439
3	Allahabad magh mela—Maintenance, 1934-35 ..	615	..	597
4	Allahabad magh mela—Electrification for 1934-35 ..	11,870	..	9,812
5	Brindaban Water Supply—Infiltration wells ..	500	..	284
6	Cawnpore drainage—Part VI—Two trial bores in connection with.	98	..	81
7	Dewa (Bara Banki) fair water supply	57,859	33,319	10,475
8	Dewa fair temporary water supply	1,910	1,564	75
9	Lucknow anti-malarial works—Ghaziuddin Hyder Canal improving the yield of the tube-well.	580	..	235
10	Lucknow anti-malarial and drainage works—Ghaizuddin Hyder Canal.	6,978	..	6,680
11	Lucknow Gomti weir maintenance	1,791	..	1,433
12	Lucknow Superintending Engineer, Public Health Department's and Chief Engineer's office—Providing lavatories and sanitary fittings in.	6,937	5,767	650
13	Meerut—Repairs to the office of the Executive Engineer, I Division, Public Health Department.	400	..	364
14	Meerut—Estimate for the rent of the residence of the Executive Engineer, 1st Division, Public Health Department, Meerut.	1,302	..	1,202
				45,032
	(b) *Allahabad District Works, Public Works Department*			
	(i) *Central*			
1	Annual repairs to endowed tombs in the Muir Road Cemetery at Allahabad.	1,374	..	1,014
2	Boring a 4" tube in the well at Bamrauli	316	..	207
3	Construction of an office building at the Civil Aerodrome, Bamrauli.	15,515	..	15,388
	Total for Central Works ..	..	..	16,609
	(ii) *Provincial*			
1	Annual repairs and maintenance of IA—Provincial Roads, Allahabad.	86,316	..	85,673
2	Maintenance of arboriculture on IA—Provincial Roads	3,672	..	3,664
3	Annual repairs to accommodation for travellers in the Allahabad District.	85	..	85
4	Maintenance of electric installation in the Allahabad Inspection House.	25	..	22
5	Special repairs to monsoon damage to the wing wall of Mansaita Nala bridge in mile 498 of the Allahabad bye-pass road.	1,500	..	924
6	Survey expenses for preparing road plans to determine the extent of encroachment in the Allahabad District.	120	..	85
7	Maintenance, erection and dismantling of a pile bridge near Sangam in the Allahabad District.	1,828	..	1,647
8	Maintenance of Pontoon Bridge at Rajghat, Allahabad	26,000	..	24,298
	Carried over..	..	..	1,16,398

APPENDIX S—(*continued*)

Statement of expenditure on construction works carried out by the Engineering Branch of the Public Health Department during the year 1934–35

Serial number	Name of works	Estimated cost	Total expenditure up to the end of March 1934	Expenditure incurred during the year
	(*b*) *Allahabad District Works, Public Works Department*—(continued) (*ii*) *Provincial*—(continued)	Rs.	Rs.	Rs.
	Brought forward ..			1,16,398
9	Maintenance of Ganges Navigation Works in the Allahabad District.	1,120	..	790
10	Maintenance of Alfred Park pumping station ..	9,600	..	8,911
11	Annual repairs and maintenance of steam plant at Rasulabad.	2,100	..	1,745
12	Rasulabad distillery—Improvement to water supply ..	7,175	3,414	3,712
13	Additions and alterations to Secretary's residence no. I	758	..	717
14	Ditto ditto ..	932	596*	932
15	Additions and alterations to electric installation to Secretary's residence no. I.	130	..	121
16	Special repairs (certain additions and alterations) to Secretary's residence no. I.	72	..	—529*
17	Providing two electric light points in the office of the Board of Revenue, block no. IV.	32	..	30
18	New High Court—Improving the acoustics in room no. 6	4,173	..	3,551
19	Converting the despatcher's room for 1st appeal and providing an expanded metal partition for the dispatcher in the translation department of the Allahabad High Court.	941	..	447
20	Certain improvement in the Government House, Allahabad	1,205	..	1,455
21	Certain improvement in the Government House, Allahabad.	303	..	37
22	Special repair to latrine in Assistant Engineer's residence, II Sub-division, Allahabad.	68	..	66
23	Quadrennial repairs to the residence of Assistant Engineer, Beli Road.	55	..	51
24	Annual repairs to Private Secretary's office	324	..	387
25	Annual repairs to Secretariat office, block no. 1 ..	4,178	..	4,180
26	Annual repairs to Departmental office, block no. II ..	2,055	..	2,035
27	Annual repairs to Accountant General's office, block no. III.	1,042	..	1,032
28	Annual repairs to Board of Revenue, block no. IV ..	1,102	..	1,295
29	Annual repairs to old C. A. and S. E.'s office, block no. V	1,439	..	1,432
30	Annual repairs to house no. I for the members of the Executive Council at Allahabad.	591	..	384
31	Annual repairs to New High Court	4,530	..	4,298
32	Annual repairs to Government Press	1,309	..	1,309
33	Annual repairs to monuments and antiquities ..	497	..	400
34	Annual repairs to Government House	8,906	..	8,858
35	Annual repairs to Assistant Engineer's residence, Beli Road.	125	..	123
36	Annual repairs to Court of Ward's Office at Allahabad..	140	..	140
37	Annual repairs to old Superintending Engineer's office at Allahabad.	380	..	380
38	Annual repairs to Assistant Engineer's residence, Government House.	152	..	147
39	Annual repairs to Superintending Engineer's residence at Allahabad.	275	..	274
40	Annual repairs to the residence of Superintendent, Printing and Stationery, at Allahabad.	165	..	164
41	Annual repairs to portion of Private Secretary's office occupied by the Head Assistant.	60	..	2
42	Annual repairs to the Secretariat clerks' quarters ..	977	..	975
43	Annual repairs to Executive Engineer's office at Allahabad.	560	..	557
	Carried over			1,66,806

*Last year Rs 596 were erroneously shown in repair work which has been adjusted this year.

APPENDIX S—(*concluded*)

Statement of expenditure on construction works carried out by the Engineering Branch of the Public Health Department during 1934-35

Serial number.	Name of works	Estimated cost	Total expenditure up to the end of March, 1934	Total expenditure incurred during the year
	(*b*) *Allahabad District Works Public Works Department*—(concluded) (*ii*) *Provincial*—(concluded)	Rs.	Rs.	Rs.
	Brought forward ..	..	..	1,66,836
44	Annual repairs to Executive Engineer's residence ..	267	..	261
45	Annual repairs to combined Public Works Department offices at Allahabad.	461	..	457
46	Annual repairs to Public Works Department godown at Allahabad.	468	..	487
47	Maintenance of sewage and drainage of Public Offices at Allahabad.	175	..	117
48	Maintenance of Bukshi, Beni, and Jumna bunds in the Allahabad District.	450	..	415
49	Water-tax for residential buildings in Allahabad ..	1,280	..	1,157
50	Annual repairs and maintenance of electric installation in the Government House, Allahabad.	1,952	..	1,614
51	Maintenance of electric installation in the non-residential buildings.	4,825	..	4,545
52	Maintenance of electric installation in residential buildings.	528	..	477
53	Special repairs to earthquake damages to Government buildings.	32,699	7,220	24,251
54	Repairs and carriage of Tools and Plant	1,456	..	1,432
				2,02,019
	II—Deposit Works			
1	Agra—Providing boosting pumps for the improvements of the cantonment water supply.	26,799	11,561	10,009
2	Agra water supply—Metering the connexions in the low-lying areas.	48,000	..	264
3	Allahabad civil lines—Two tube-wells	49,977	9,534	294
4	Bareilly anti-malarial works—Storm water drain in jail compound.	11,507	34	11,148
5	Brindaban infectious diseases hospital	44,686	32,442	1,530
6	Brindaban water supply—Construction of four infiltration wells.	13,700	..	..
7	Budaun drainage extension	45,740	..	14,218
8	Dehra Dun infectious diseases hospital	46,621	32,261	..
9	Fyzabad water supply extension	57,806	37,354	547
10	Fyzabad water supply extension—A tube-well near the existing tube-well no. 3.	13,380	396	10,445
11	Fyzabad-Ajodhya—Two tube-wells	37,112	14,120	4,067
12	Ghazipur water supply—Trial tube-well (revised estimate)	12,669	11,646	—3
13	Gorakhpur drainage II instalment (revised) ..	1,02,994	1,00,629	1,356
14	Hardwar—Addition to infectious diseases hospital ..	24,990	23,636	1,176
15	Hardwar—Improvement to Har-ki-Pairi (constructing a R. C. Bridge).	1,95,528	..	12,594
16	Hardwar water supply extension—Constructing a 4th tube-well.	54,633	8,607	2,334
17	Hardwar water supply extension—Construction of 4th tube-well (2nd revised estimate).	18,841	18,091	381
18	Hathras water supply	3,89,736	1,72,719	75,764
19	Jaunpur water supply	4,11,037	10,139	93,644
20	Jhansi water supply extension—City service reservoir ..	44,680	..	4,009
21	Lucknow inlets for Mawaiya sewers and Dariba open drains in G. H. Canal lining and sewer.	567	14	459
22	Lucknow anti-malarial works and drainage work—G. H C. New inlets.	4,495	..	3,306
23	Sandila Nawab Mohammad Yousuf—Meat market ..	9,687	3,621	244
24	Unao Drainage	1,89,316	1,25,670	2,516
	Total ..	..	..	2,50,302

THIRTY-NINTH ANNUAL REPORT

OF THE

SUPERINTENDING ENGINEER

PUBLIC HEALTH DEPARTMENT
UNITED PROVINCES

FOR THE YEAR ENDED MARCH 31, 1934.

ALLAHABAD:
SUPERINTENDENT, PRINTING AND STATIONERY, UNITED PROVINCES
1934

Thirty-ninth Annual Report of the Superintending Engineer, Public Health Department, United Provinces, for the year ended March 31, 1934.

DUTIES which have been undertaken by this department during the year are set out in the table below :—

Item no.	Nature of work	Amount involved in lakhs of rupees	Remarks
1	Duties under the Local Authorities Loans Act, 1914, and the Municipalities Act, 1916, i.e. the supervision and inspection of all open water-works and drainage pumping stations.	67·22	This amount represents the turn-over in revenue and expenditure on water supply, drainage and electricity supply and is made up as follows :—
2	Local works—		
	(a) Preparation of projects ..	9·43	17 detailed proposals.
	(b) Construction	4·02	Payments made.
3	Provincial works—		
	(I) *Miscellaneous*		
	(a) Preparation of projects ..	0·50	12 detailed projects.
	(b) Construction	0·64	Payments made.
	(c) Maintenance	0·09	Lucknow Gumti Weir, G. H. Canal Anti-Malaria Works and Allahabad Magh Mela maintenance.
	(II) *Allahabad District Work.*		
	(a) Preparation of projects ..	4·14	36 detailed projects and one preliminary proposal.
	(b) Construction	0·04	Payments made.
	(c) Maintenance	1·67	
	(III) *Central Works.*		
	Maintenance	0·01	
4	(a) Advice free to local authorities ..	40·71	18 forecasts of cost with reports and one special report on Bara Banki Water Supply supplied free.
	(b) Advice free to Government departments.	0·56	8 forecasts of cost with reports supplied free.
5	Board of Public Health Business :		
	(a) Examination of projects for urban works.	30·44	41 projects were scrutinized.
	(b) Examination of projects for rural sanitation.	2·15	344 projects were scrutinized.
	(c) Checking progress on urban and rural areas works, G. O.'s nos. 463/XI, dated 6th February, 1931, 470/XI, dated 6th February, 1931, 580/XI, dated 11th February, 1931 and 490/XI, dated 9th April, 1931.	6·70	Progress reports collected and consolidated for the Accountant General, United Provinces.
6	Examination of projects for Provincial works.	2·03	34 projects were examined.
7	Inspection and reports on works carried out by local bodies	3·24	
8	Scrutiny of certain Municipal Budgets, G. O. no. 4718/XI—10-H, dated the 6th January, 1933.	434·85	Under head of revenue and expenditure: water supply, electric supply, drainage, conservancy and sewage disposal, public works, public lighting, 279 budgets comprising original and revised schedules and budgets of 89 municipalities were scrutinized.

	Revenue	Expenditure	Total
	Rs.	Rs.	Rs.
Water-works.	29,74,526	23,08,869	52,83,395
Drainage.	50,168	88,112	1,38,280
Electric supply.	6,80,446	6,20,106	13,00,552
Total..	37,05,140	30,17,087	67,22,227

The value of projects, including preliminary proposals and forecasts of cost prepared during the year under review, amounted to Rs.57·20 lakhs and expenditure on construction to Rs.5·42 lakhs, as against last year's figures of 29·38 lakhs and 3·36 lakhs respectively.

Fees.

Of the eight items given in the tabulated statement, fees are recoverable only on item 2. During the year under review an amount of Rs.20,714 was earned as fees on project work against an amount of Rs.15,379 anticipated. Including the arrears for the previous year a sum of Rs.16,625 was realized as fees for the preparation of projects. Earnings for construction works carried out by the department amounted to about Rs.43,853. Thus for works carried out for local authorities a total sum of Rs.60,478 was realized against Rs.46,000 anticipated as recoveries in the sanctioned budget.

In addition to the recoveries noted an amount of Rs.2,793 was earned as rent for tools and plant against Rs.2,182, realized. Further, a sum of Rs.1,256 was earned on account of supervision charges on the value of work carried out in the workshops of the Well-Boring Operations Division.

Effect of prevailing economic conditions on local budgets.

The administration reports of the 33 municipalities received in this office show that these bodies incurred a total expenditure of nearly one crore and twenty lakhs of rupees, of which nearly forty-eight lakhs constitute expenditure on public works against the last year's figures of 1¼ crores and 70 lakhs respectively. The expenditure on water-works in those municipalities where water-works function amounted to about twenty-six lakhs showing an increase of about one lakh on the last year's expenditure.

Present stage of development.

The annual returns of local authorities show that a total urban population of 1·50 millions is regularly supplied with potable water from municipal water-works; the total daily supply averaging 41 million gallons. In addition a temporary population of roughly 3·94 millions consisting mainly of pilgrims attending melas was served with a supply estimated to amount to three gallons per head per day.

Units aggregating about 6,700 water horse power have now been brought into regular operation in the pumping stations of the different municipalities in these Provinces controlling their own water-works.

Retrenchment.

The department has again suffered further retrenchment during the year and in consequence routine inspections have had to be much curtailed. One post in the cadre of specialist officers will be abolished from June, 1934, and a second post is also under orders of abolition from the same date. The post of an assistant engineer who is on leave preparatory to retirement has also been brought under reduction.

The activities of the department show no signs of abatement; in fact the work is steadily increasing and new water-works are being brought into operation from year to year. The staff, however, has been reduced to such an extent that it is with very great difficulty that the duties laid down in the Municipal Manual and other Government notifications are carried out.

It has not been possible to take up several works on account of the reduction of staff. Completion reports and plans for works long completed have also been delayed for the same reason.

Budgets of local authorities.

The budget proposals of local authorities are now scrutinized and advised on by the department, particularly in regard to expenditure on water-works and drainage and it is hoped the advice tendered will result in an improvement in the expenditure of the funds available. This duty has thrown much extra work on the office of Superintending Engineer, particularly as most of the budget forms are received long after the dates due and after repeated reminders. In some cases proposals have been received after the close of the year budgeted for.

ADMINISTRATION OF PUBLIC WORKS BY LOCAL AUTHORITIES

It would appear that the rules laid down in the Municipal Manual for the inviting of tenders for contracts for works are not being strictly observed by some of the local authorities, for several cases have been brought to notice where tenders for inferior consumable stores, such as oil and coal, have been accepted. Other irregularities in inviting and accepting tenders have also been brought to notice by disgruntled contractors. One board gave insufficient time for the submission of tenders, and in consequence only received one offer which was too high. This was turned down and fresh tenders invited, but the lowest tender was not accepted—the work being given to the original tenderer who was allowed to amend his total to bring it into line with that of the lowest tender.

Purchase of Stores.

It is regrettable more boards do not make use of the facilities offered by the Government of India Stores Purchase Department and by the Provincial Stores Purchase Officer. Details of the facilities available have been brought to the notice of all the municipalities in the Province, but the Mussoorie and Fyzabad boards are the only authorities who make use of this agency for the purchase of stores, such as

fuel and lubricating oils, cement, meters, cast iron, galvanized and steel pipes. The advantages that would accrue from adopting this course are many, materials to a rigid specification and of tested quality would be available at competitive rates instead of materials to a local specification for which no facilities are available for inspection at source of supply or during manufacture.

Appointment of Municipal Officers

The efficiency of local government depends to a large extent on the character, technical qualifications and administrative ability of the officers employed by the local authorities.

The Municipal technical services in these Provinces do not attract the best type of men, excepting, of course, the office of Medical Officer of Health which is filled from the cadre of the United Provinces Public Health Service.

During the year applications have been received for the post of Municipal Engineer to a class I municipality.

The salary offered should have been sufficient to have attracted first class men with experience in all branches of municipal engineering, but few candidates had had sufficient experience in modern road construction and maintenance and none extensive experience in water supply and drainage work.

The responsibilities of municipal and district boards, particularly in regard to the execution of public works, are increasing from day to day and assistance from Government technical officers is not forthcoming to the same extent as formerly. It is, therefore, necessary that first class men should now be appointed to fill the technical posts of Municipal Engineer and Water-works Superintendent and this can only be done by making the service more attractive, giving better prospects of promotion and greater security of tenure.

Municipal engineering has made great strides in other countries during the last decade, but the profession has no standing in these Provinces and little improvement in regard to the administration of public works by local authorities will be possible until officers trained in this branch of engineering are forthcoming.

Government inaugurated a Provincial Service of Medical Officers of Health from 1st July, 1927, and these officers receive, in addition to their medical training, an extensive course in public health and are obliged to obtain a diploma in the subject.

Some similar scheme for providing a trained cadre for the Engineering Services of local authorities is considered essential.

It is understood that the progressive Madras Government have a proposal of this kind under consideration and it should not be difficult or costly to introduce some similar scheme in these Provinces.

Trained and experienced men suitable for the appointment of Water-works Superintendent to the large municipalities are also not forthcoming, judging from the applications recently received for the post of Water-works Superintendent to one of the most important towns. A trained cadre of officers to fill these appointments, which are increasing in importance, is also very desirable.

Fire protection measures.

One or two fires in the large towns has brought home the fact that unless fire, fighting appliances are maintained in good order, damages amounting to lakhs of rupees can be done in a short time and loss of life also may result. Unfortunately a continuous supply of water throughout the day is not available in most of the towns in the plains and valuable time is lost in turning on the water or in manipulating the supply to serve a particular area. However, much can be done by keeping the fire-fighting apparatus in good order, and in towns where there is an elevated reservoir or balancing tank, taking care to see that there is an ample reserve of water in storage when the supply is turned off.

It is necessary that the position of fire hydrants should be indicated by means of name plates. The pillar type of fire hydrant manufactured by Merryweather (similar types can be obtained from other manufacturers) is preferable to the hydrant taken directly off the main and contained in a chamber in the roadway. Chairmen of boards would be well advised to initiate in their towns a survey of the existing arrangements for coping with fires, and put up proposals for supplementing the very inadequate provision which now exists in most places. More hydrants which should be in a conspicuous place and fire alarms are required, and staff for manning the fire engine should be regularly practised in their duties under the control of an officer who for preference should be the local Water-works Superintendent or his deputy, if funds do not permit of the appointment of a Special Officer.

The relations between officers of this department and the boards throughout the Province have, with few exceptions, been cordial.

Advice has been given freely to local bodies either directly or through the Board of Public Health regarding the preparation of detailed plans and estimates for works and the inviting of tenders for contracts for works.

It would appear that one or two boards do not appreciate the advantages of calling for competitive tenders in the manner directed in Government notification no. 1015/XI—91, dated April 3, 1930, and would prefer some other method of obtaining bids.

Also one or two boards look upon with disfavour advice given by the department regarding the selection of technical staff and resent what they consider interference with their prerogatives when opinions are given regarding the strength of staff that should be employed for the maintenance of water-works and drainage works.

Water Supply—General

Statements are included in this report showing the consumption of water in those towns having their own water-works; information is also included in these statements from which the relative increase in the number of metered and unmetered connexions and standposts may be judged; the expenditure on maintenance and interest and sinking fund, the cost per thousand gallons of water supplied and the profits which the various authorities made on their water supply are also shown.

As usual there has been an acute water shortage during the hot weather in all the large towns in the plains and there are complaints of shortage even in the winter months in some of the towns.

The public are becoming concerned and in one town a group of rate-payers have petitioned the board asking for a refund of water tax paid as they consider that the minimum quantity of water they are entitled to has not been supplied.

Cantonment and railway authorities in some of the towns are also very dissatisfied with the limited supply they are receiving and are making arrangements either to supplement the town's supply or to have their own independent supply.

The water supply rules in the different towns vary slightly, but there is no doubt at all that the board of every municipality in which a water tax is imposed is under a statutory obligation to supply within every 24 hours a minimum amount of water according to the water tax paid to every house-holder entitled to a connexion. Such water to be supplied into a storage tank erected in or on the building at an altitude not exceeding the maximum prescribed.

It is very doubtful if any of the municipalities can give in the hot weather the prescribed quantity of water at the requisite pressure in certain districts within the area of their supply.

This state of affairs is most unsatisfactory and if something is not done, the boards may be faced with the difficulty of recovering taxes from those persons who consider they are not receiving the quantity of water they are entitled to under the Act or the rules made thereunder.

There is no doubt that excessive consumption of water is taking place in all the large towns in the plains and a large section of the public resent any steps taken to limit the supply and also do not welcome any proposal for the installation of meters, which would check waste and enable control to be regained.

The boards are also greatly handicapped by the system of ferrule rating in force which was introduced by the Government some 40 to 50 years ago when public water supplies were first inaugurated in the Province.

The idea of the system was presumably to restrict the supply according to the amount of water tax paid by the individual house-holder, for example, in Allahabad, and the scale is very similar in other towns in the plains the size of ferrule allowed is as follows :—

	Size of ferrule.	No. of taps.
(1) For a building or land assessed to a water tax of Rs.6-7-8 per annum ...	⅛″	1
(2) For a building or land assessed to a water tax of Rs.16-3-2 (or more) per annum	¼″	2
(3) For a building or land assessed to a water tax of Rs.32-6-4 (or more) per annum	⅜″	3
(4) For a building or land assessed to a water tax of Rs. 48-9-8 (or more) per annum	½″	4
(5) For a building or land assessed to a water tax of Rs.81 (or more) per annum ...	½″	any number of taps.

And as it was feared that the smaller sized ferrules might not in some cases give the requisite quantity of water, this contingency was also allowed for, the executive officer of the board being given powers to increase the size of ferrule—if the ferrule of the prescribed size was too small to pass in any six hours a quantity of

water equal to 5½ gallons for every rupee of water tax annually assessed on the building.

The board is also under an obligation to deliver into a storage tank minimum quantities of water as follows to comply with section 228(1)(c) of the Act :—

For a building assessed to a water tax of Rs.6-7-8 per annum (or less).	40 gallons per 24 hours
For a building assessed to a water tax of Rs. 16-3-2 per annum (or less).	70 gallons per 24 hours
For a building assessed to a water tax of Rs.24 per annum (or less).	100 gallons per 24 hours
For a building assessed to a water tax of more than Rs.24 per annum.	Ditto

plus an additional 40 gallons for every Rs.7 of water tax assessed in excess of Rs.24 up to a maximum of 500 gallons.

It will be gathered from the above that the whole object of introducing the various sizes of ferrules was to give a graded supply in some relation to the tax paid.

For some reason or other the installation of cisterns or storage tanks in houses connected to a public supply has not been insisted on with the result that a considerable amount of decentralized storage, which, to some extent, would have equalized the draw-off, is not available. However, it is fortunate for some of the consumers, and for the boards for that matter, that cisterns are not more common, as the owners or occupiers are entitled to have them fixed at a certain height according to the local water supply rules and in some localities in all towns in the plains at certain times of the year the pressure is so low that the tanks on a good many occasions would never be filled.

The ferrule system described and in vogue in all the towns, excepting Naini Tal and Mussoorie, has not worked out according to plan and it is not at all surprising, as it would appear that the idea was based on the assumption that there would be no great variation of pressure in the area of distribution and the discharge would be in some relation to the sectional area of the constricted opening.

This is not the case in practice. Due to frictional losses and other causes the discharge through ferrules of varying sizes fixed on ½ inch service connexions is not in direct proportion to their respective areas. Further, there is also a wide variation in pressure in the distribution systems of all the towns on the plains and this affects the discharges to a considerable extent.

Figures will make the matter clear. From calculations it has been ascertained that the approximate discharge of a ½ inch service pipe 40 feet in length with ferrules of the sizes stated is as follows :—

Under a head of 20 feet

⅛ inch ferrule	0·89	gallons per minute.
¼ ditto	2·48	ditto.
⅜ ditto	3·06	ditto.
½ ditto	3·24	ditto.

Under a head of 70 feet

⅛ inch ferrule	1·74	gallons per minute.
¼ ditto	4·60	ditto.
⅜ ditto	5·69	ditto.
½ ditto	6.03	ditto.

It is, therefore, possible under this system of rating, due to the variation in pressure in the different distribution systems which in some cases amounts to as much as 50 feet for a house-holder living in a locality where the pressure is high and entitled to a ¼ inch ferrule, to obtain more water than a house holder with a ½ inch ferrule, paying the maximum water tax, living in an area where the pressure is low.

It is also not generally realized that even with a ⅜ inch ferrule a discharge up to 5 gallons per minute is possible and that 1,000 gallons of water can easily be used per day if the tap is kept open for three to four hours. And if the water was paid for by measurement at 5·33 annas per 1,000 gallons, the rate in Lucknow, the consumer would be called upon to pay an amount of Rs. 122 instead of a minimum water-rate of Rs.27 per year.

The recent amendment Act to the Municipalities Act passed this year empowering boards, with the sanction of the Local Government, to hand over their waterworks to approved licensees, and in towns where there is no piped system to give licences for water supply to approved persons, further complicates the matter, as it is extremely doubtful if private water supply companies will be able to operate under the system of ferrule rating now in vogue. It is, therefore, considered that the time has come when the present water law and the model rules made thereunder should be revised and amended so that they can be made applicable to supplies

controlled either by municipal boards or private companies. A Water Supply Act on somewhat similar lines to the Indian Electricity Act seems to be indicated.

Under the present Water Supply Rules the boards are not able to fulfil their obligations to the public and they are further handicapped by their distribution systems which are arranged in such a manner that it is not possible to maintain a uniform pressure within the area of supply. Neither can control be exercised over consumption and it is not possible to introduce any effective measures of waste detection.

The present state of affairs is most unsatisfactory and there would appear to be no prospect of improvement if matters are allowed to drift on as they are doing—in fact, things will go from bad to worse. Conditions have changed completely since the original water-works were inaugurated and steps should now be taken to review the whole position and to introduce measures whereby much needed improvements can be effected. It is considered that this can best be done by the appointment of a statutory committee, who should advise Government as to the steps that should be taken to put the different water supply undertakings on a more equitable basis as regards distribution of the water, and on the amendments and modifications that should be made to the existing Water Law and Rules.

Decisions on other matters, such as the maximum free allowance of water per head of population which should be allowed in the different classes of towns in the Province, should also be given, as water consumption has increased to such an extent that the demand cannot be met and large extensions to the existing water-works will not solve the problem, if the present system of distribution and ferrule rating is allowed to remain.

Recommendations regarding the reorganization of the distribution systems and the different methods of controlling the supply, that is, by the installation of meters or by the introduction of break-pressure tanks or other apparatus for reducing consumption, should also be made.

Drainage (General)

More boards are showing an interest in drainage works and there is no doubt that a well-designed drainage scheme is an asset to a town and of considerable advantage to owners of adjacent property, as the land values in the vicinity are increased. The public are also beginning to appreciate the benefits of a system which makes their houses habitable and living conditions more tolerable.

There is, however, still an inclination on the part of some local authorities to prefer a system of open surface drainage in lieu of underground sewers. Open drains function fairly satisfactorily in small towns where there is no piped water supply and where conditions are such that underground sewers are not feasible, but in the large towns open drains taking the place of sewers become little better than elongated sewage tanks and sanitary conditions become worse instead of better.

Drainage schemes are invariably more costly than water supply schemes and produce no revenue, excepting in the towns where there are sewage farms, and these are usually not worked to the best advantage. Boards can only finance these works to a limited extent, and as little assistance in the form of grants-in-aid is now forthcoming from Government, not much progress is being made in this direction.

Operations of local authorities and other works

AGRA.

Water supply maintenance—The water supply was maintained without a recurrence of the trouble which occurred last year, when foul water due to the Jumna river being practically dry, was pumped and subjected the filtration plant to the severest test.

There have, however, been many complaints regarding low pressure and shortage of water in the high districts, while the low-lying districts have received practically a 24 hours' supply.

An estimate amounting to Rs.48,000 has been sanctioned for the provision of meters on private connexions. The proposal is to meter all connexions of ½ inch ferrule and upwards in all the low-lying areas where waste of water is most apparent.

However, since the project has been sanctioned the board has agreed to the conversion of a number of ferrules to a diameter of less than ½ inch, which to some extent, will nullify the advantages which would have accrued if the scheme had been carried out in its entirety.

The legal position regarding the installation of meters on all connexions, irrespective of whether there is waste or not, requires examination and some modification in the Water Supply Rules may be necessary.

The board after considerable delay accepted a tender for an inferior quality of coal, in spite of the recommendations of the Water-works Superintendent to the contrary.

AGRA—(concluded)

Most of the pumping plant is old and requires replacement. During the year a crack appeared in one of the low pressure cylinders of the High Duty Worthington, and on examination it was found that there were other defects also in the unit. A considerable sum will have to be expended on repairs, and replacement by an entirely new unit may be the most satisfactory way out of the difficulty.

Cantonment water supply (Boosting pump, Rs.0·27 lakhs)—The work, which has been split up into two contracts as follows, is nearing completion :—

Contract no. 1—For the supply and erection of the pumping plant is being carried out by Messrs. Mather and Platt and the plant has been installed.

Contract no. 2—Comprising the building and pipe-laying work has been carried out by Babu Ram Chandra Verma, contractor. The expenditure incurred during the year amounts to Rs.11,561.

Metering connexions in the Low Zone of supply (Rs.0·48 lakhs)—The project has been sanctioned, but work has not yet been started as funds have not been made available.

Drainage (Rs.6·97 lakhs)—Due to complaints of the cantonment authorities regarding the pollution of the river near the Fort, a meeting was arranged at the *site* and the following attended: the Commissioner, Collector, Cantonment officers, the Assistant Director of Public Health and the Executive Engineer, I Division, Public Health Department. Certain recommendations were made, more as a palliative than a remedy, as the matter cannot satisfactorily be dealt with until the comprehensive sewage scheme is taken in hand.

No further developments have taken place as regards the comprehensive drainage scheme, except that the cantonment authorities now contemplate taking up their portion of the work separately. A forecast of cost amounting to Rs.6,96,500 has been prepared at the request of the cantonment authority by the Executive Engineer, I Division, for the work.

Dayalbagh drainage—A fair project estimated to cost Rs.1,89,132 has been prepared for the drainage of the colony controlled by the religious and philanthropic society known as the Radha Swami Institute.

AJODHYA.

Water supply construction of two tube-wells (Rs.0·37 lakhs)—One 6 inch diameter well of the gravel feed type was completed in 1931 and the yield was very satisfactory, so the construction of a second tube-well of a similar type has been taken in hand and the work is being carried out by Messrs. Scott and Saxby.

ALIGARH.

Water supply maintenance—The town is supplied with water by four tube-wells. Out of these only one is functioning properly; two others are yielding sand and the steining of the fourth well is badly cracked.

The board do not levy a water tax and consequently have no funds available for improvements or extensions and yet they still permit house connexions.

A proposal of the board to hand over the water supply to a licensee is under the consideration of Government, but it may be some time before the preliminaries are settled. In the meantime, unless the board take some action, the public are going to be badly off for water.

ALLAHABAD.

Water supply maintenance—The pumping plant at both Karelabagh and Khusrubagh have been well maintained during the year and no serious defects have been reported. The rapid filters have also functioned satisfactorily.

There is a great shortage of water in the outlying districts, and some of the residents in George Town have threatened non-payment of water tax if the quantity of water they are entitled to is not forthcoming.

Allahabad is in the same predicament as the other large towns in the plains, and it is perfectly apparent that the present system of water distribution cannot continue, as the rate-payers are showing signs of revolt. The inequalities in pressure in Allahabad are such that a rate-payer assessed to a minimum water tax is in some cases in a position to get as much water as a rate-payer in a district where the pressure is low, paying the maximum tax.

Metering and waste prevention (Rs.1·73 lakhs)—A scheme prepared by the Executive Engineer, II Division, has been under the consideration of the board and funds were available, but the board wished to leave the question of metering over until other recommendations for reducing waste had been put into force. These proposals were not acceptable to Government, so the funds earmarked for the purpose were not released. It would appear that the board are not enamoured of any scheme that will involve wholesale metering of the connexions under ½ inch diameter and this attitude is not peculiar to Allahabad, as the other large towns in the plains have the same objection.

Water supply extension (Two tube-wells in Civil Lines)—This work was started in August last, but trouble has been experienced with the well in Thornhill

ALLAHABAD—(contd.).

Road due to the auxiliary tubes put down for developing the well becoming jammed. Proposals have, however, been put forward by the contractors for inserting a strainer and it is hoped this will overcome the difficulty.

Magh Mela water supply (*Rs* 0·15 *lakhs*)—The laying of the distribution mains was completed well in time for the mela and the supply began from 27th December, 1933, and was satisfactorily maintained throughout the whole period.

Proposals for fire protection equipment are under consideration.

Magh Mela electric supply (*Rs.*0·11 *lakhs*)—The installation was satisfactorily maintained throughout the mela period. One of the special features of this year's lighting was the electrification of the official camps for the small sum of Rs.450.

Pumping plant for two tube-wells in Civil Lines (*Rs.* 0·72 *lakhs*)—A forecast of cost for this has been approved by the municipal board.

Tube well in Alfred Park (*Rs.*0·14 *lakhs*)—Investigations as to the costs of operating the Alfred Park pumping station have been made and a scheme for remodelling the existing riverside pumping station will be put forward to enable an unfiltered water supply to be given to Government House and for other purposes at a minimum cost if the railway authorities are not prepared to give a bulk supply from their riverside station.

Magh Mela boat bridge and river training works (*Rs.* 0·08 *lakhs*)—As the main current did not follow its usual channel this year, some river training work had to be done and a small boat bridge was constructed for the convenience of the pilgrims attending the mela.

District jail drainage (*Rs.*0·05 *lakhs*)—A forecast of cost amounting to Rs.5,025 for improvements to the drainage of the jail quarters has been prepared and forwarded to the jail authorities.

Allahabad district work (Public Works Department)—In pursuance of G. O. no. 251/II—M-3, dated 22nd April, 1933, the Allahabad district work was taken over by this department on 27th April, 1933. The work has been split up into four contracts as indicated below :—

Maintenance of I-A provincial roads (*Rs.*0·75 *lakhs*)—Messrs. Munnalal Govilla, the contractors for the water-bound roads, have carried out the maintenance of the mileage under their charge satisfactorily and have made good arrangements for the collection of kankar.

Messrs. McKenzies, Ltd., have maintained the painted roads under their charge in a very satisfactory manner and have also expeditiously carried out surface painting work in the miles requiring treatment.

During the year 15 miles of kankar roads and 2½ miles of stone metal roads were renewed and about 9¼ miles have been painted or re-painted.

Pontoon bridge (*Rs.*0·34 *lakhs*)—Due to the changing course of the river this year the task of the contractors, Messrs. Munnalal Govilla, was rendered extremely difficult, but the bridge was maintained satisfactorily, in spite of the unfavourable conditions. Under this head it has been possible to make substantial savings amounting to about Rs.9,000, the major portion of which was re-appropriated for road improvements.

Buildings (*Rs.* 0·32 *lakhs*)—The repairs and maintenance of Government buildings now forms one contract and the several works have been carried out satisfactorily by the firm of Messrs. Noorullah Ghazanfarullah, whose tender was accepted.

Maintenance of electric installations (*Rs.*0·07 *lakhs*)—This work, the contracts for which were placed by the Public Works Department prior to the II Division taking over the district work, has been carried out satisfactorily, but the fans and fittings in some of the buildings are very old and need replacement.

Annual inspections of buildings—The usual inspections of all the Government buildings and cemetries were carried out during the year and advice has been given to the heads of the departments, whenever required, regarding the acceptance of estimates and other matters.

Special repair work and inspections due to earthquake (*Rs.*0·33 *lakhs*)—In addition to the usual maintenance works, special repair works of some magnitude were necessitated by the earthquake shock of 15th January, 1934; these were undertaken and completed at short notice.

Pumping stations and pumping plants (*Rs.*0·12 *lakhs*)—The Alfred Park pumping station and the Rasulabad distillery pumping plant were maintained departmentally during the year. The demand of the distillery for water has outstripped the capacity of the steam plant and to cope with this a new well is under construction, and an electro-motor pumping plant will be installed in this, and a similar plant will also replace the steam pump in the existing well.

Arboriculture and other miscellaneous work (*Rs.0·05 lakhs*)—Arboriculture was carried out departmentally. Other minor works, such as maintenance of Bakshi and Beni Bands and River Navigation works, were done either departmentally or by piece work agreements entered into with petty contractors. ALLAHABAD—(*concluded*).

Original works (*Rs.0·11 lakhs*)—A number of original works, such as the "re-organization of the water supply of the Rasulabad distillery", additions and alterations to the Bamrauli Aerodrome, and additions and alternations to the Secretary's bungalow, were also taken in hand during the year.

Water supply improvement (*Rs.0·44 lakhs*)—A forecast of cost for extensions to the water supply is under preparation. ALMORA.

Drainage improvement (*Rs.0·69 lakhs*)—A scheme has been prepared by the municipal board for improving the drainage of the town and this is under examination.

Hydro-electric scheme (*Rs.4·00 lakhs*)—The municipal board are considering the possibility of a hydro-electric scheme with the river Kosi as the source of power. The fall available being low and the discharge insufficient, it is doubtful if a self-supporting scheme will be possible.

Meat market (*Rs.0·02 lakhs*)—A forecast amounting to Rs.2,029 for the construction of a meat market has been prepared and submitted to the Chairman of the board. BALLIA.

Water supply (*Rs.0·07 lakhs*)—A forecast of cost amounting to Rs.7,000 for improving the water supply of the official colony at Banbasa was prepared at the request of the Irrigation Department. It is understood that the proposals have been carried out, and that the installation is functioning satisfactorily. BANBASA.

Drainage (*Rs.0·42 lakhs*)—The main work was completed in 1933 with savings amounting to Rs.1,228, which the Notified Area Committee requested should be utilized for extensions. An estimate was accordingly prepared and as the expenditure was small the notified area were asked to carry out the work themselves. BANBHULPURA (HALDWANI).

Tube-well in District Jail (*Rs.0·20 lakhs*)—At the request of the Superintendent, District Jail, Banda, a forecast of cost was prepared by the Executive Engineer, Well-Boring Operations Division, for a bore to be driven through the upper Vindhyan strata with the object of striking a fissure containing water. But no action has been taken owing to lack of funds. BANDA.

New Reserve Police lines—sinking 4" pipes in two existing wells (*Rs.0·02 lakhs*)—Out of the seven existing masonry wells constructed in the compound, two pass through kankar strata and the sub-soil water level is below this. It was considered that a 4 inch diameter pipe sunk in each well might tap some spring at lower level and improve the yield. A forecast of cost amounting to Rs.1,500 was accordingly prepared for sinking tubes up to 100 feet depth below ground level. This was approved by the Executive Engineer, Provincial Division, Allahabad, and work was taken in hand in one of the wells. The tube was sunk to a depth of 130 feet but no spring was tapped so the work was abandoned.

Water supply (*Rs.0·80 lakhs*)—A forecast of cost amounting to Rs.0·80 lakhs was prepared and submitted to the District Magistrate, Bara Banki, who for the time being is administratively in charge of the municipality. BARA BANKI.

Anti-malarial works (*Rs.0·12 lakhs*)—Two instalments of this work have already been carried out, the third instalment estimated to cost Rs.11,507 is now in hand, and it is expected that work will be completed by the middle of April, 1934. BAREILLY.

Water supply maintenance—The pumping plant at both Bhelupura and Bhadaini have been well maintained during the year. The impellers and other working portions of the pumps are generally in good condition. The stand-by steam plant, although it has not been used for many years, is all in proper order and ready for use in the event of an emergency. BENARES.

The settling tanks have been systematically cleaned out, the silt is used for making bricks, and the enterprise seems to be quite successful.

The weir recording chamber together with the inlet channel has been entirely reconstructed in steel work by the Water-works Superintendent and is now functioning satisfactorily.

The slow sand filters have operated fairly satisfactorily, but the quality of water supplied by them on many occasions during the year has not been up to the recognized bacteriological standard. In consultation with the Medical Officer of Health it has been thought advisable to chlorinate the filter effluent at all times, so as to prevent the possibility of unpotable water being supplied to the public. The necessary chlorination apparatus has been obtained and is at work.

Water supply waste prevention measures (*Rs.5·03 lakhs*)—Complaints about the insufficiency of the water supply continue to be received from the high zone areas and with the present arrangements it does not seem possible to improve

BENARES—(*concluded*) matters greatly unless steps are taken to prevent the obvious waste which is taking place. The consumption figure this year is about 36·78 gallons per head per day, which is excessive, taking into consideration the fact that many consumers get an insufficient supply. The Water-works Superintendent has already prepared a provisional scheme for wholesale metering, the idea being to introduce a sliding scale of charges depending upon the amount of excess water taken. However, before such a scheme can be introduced, reliable data as to the quantity of water actually consumed by unmetered consumers, is necessary, and Mr. Lynch, the Additional Magistrate in charge of the administration of the municipality, has agreed as an experimental measure for the Water-works Superintendent to instal 100 meters for which no rent will be charged for the purpose of obtaining this information.

Workshops—The water-works workshops continue to be a profitable source of income due to the good management of Mr. Dastoor, Water-works Superintendent.

Fire protection—A motor operated fire engine has been purchased, but its use is limited, as there are not a sufficient number of fire hydrants on the distribution system.

Drainage improvements (*Rs.*2·85 *lakhs*)—Owing to the more favourable financial position of the board, the prospects of something being done to improve the drainage of the town, particularly of the portion fronting the river, are brighter, and as a beginning fees have been deposited for the preparation of detailed proposals for the first instalment of the comprehensive scheme and the work will shortly be taken in hand by the Executive Engineer, II Division, Public Health Department.

BRIND ABAN. *Water supply and drainage*—No developments have taken place in regard to these projects during the year. The board are pressing for something to be done, as the water shortage is very acute. The possibility of obtaining a supply from the river or some source other than tube wells is now under investigation.

Infectious diseases hospital (*Rs.*0·45 *lakhs*)—This work was completed last year, but it was considered advisable to line an open drain in the vicinity of the hospital. A tender has been accepted for this and the work will be taken up in April, 1934.

The expenditure incurred during the year amounts to Rs.6,790.

BUDAUN. *Drainage improvements* (*Rs.*0·46 *lakhs*)—Up to date two instalments of the drainage scheme have been carried out. Detailed proposals for a further instalment estimated to cost Rs.0·46 lakhs were prepared in 1931, but the construction could not be undertaken at the time owing to lack of funds. The Board of Public Health, however at a meeting held in March, 1934, approved the proposals and sanctioned a grant of Rs.20,000 towards the cost, the municipal board having undertaken to find the balance to complete the work. The construction will shortly be taken in hand.

CAWNPORE. *Water supply maintenance*—The pumping plant at both stations has operated satisfactorily during the year under review. The tube well still forms a valuable asset to the water-works and yields over 300 gallons per minute. The old steam sets as usual have been maintained as standby. Raw water for the greater portion of the year has been taken from the Ganges Canal and the river side pumping station maintained for emergency and for times when the canal is closed.

Cawnpore still maintains the greatest percentage of metered connections of any town in the plains and in consequence earns the largest margin of profit. The board are therefore able to finance improvements and extensions without assistance from Government.

Cantonment water supply improvements (*Rs.*3·31 *lakhs*).—A forecast of cost for this was drawn up at the request of the Executive Officer, Cantonment Board.

Permat sewage pumping station reorganization (*Rs.*2·0 *lakhs*)—A detailed scheme was forwarded to the Municipal Engineer in May, 1933, for the consideration of the board, but no decision has yet been communicated.

Drainage, Part VI (*Rs.*2·27 *lakhs*)—A detailed scheme is under preparation by the Executive Engineer, Well Boring Operations Division.

DEHRA DUN. *Water supply maintenance and construction*—Shortage of water is acute during the hot weather due to the diminished yield of the springs and in an endeavour to find another source of supply the Board of Public Health gave a grant of Rs.18,700 towards the cost of an experimental tube-well and of this amount a sum of Rs.18,263-14-3 has been expended.

It was hoped that if the well was sunk deep enough, a sub-artesian supply might be tapped. It was also anticipated that deep boring in the boulder strata in the Dun valley would be beset with difficulty.

The tube was taken down to a depth of nearly 430 feet when a boring tool jammed and could not be removed. The rest water level established itself at 300

feet below ground, which does not allow sufficient submergence for an air lift pump and the installation of a deep well pump was thought to be too much of a risk as there were no means available of testing the yield of the well, so the board were advised to abandon the idea of obtaining a supply from this source.

DEHRA DUN —(*concld.*).

The municipal board have now under consideration forecasts of cost for two alternative proposals for supplementing the supply, and a decision should be arrived at early in view of the acute shortage and the quality of the water now supplied, which is excessively hard.

Chlorinating plant (*Rs.*0·16 *lakhs*)—The realignment of the 4 inches pipe line below the Kolukhet chlorinating plant, which was in hand last year, has now been completed. It was hoped that there would be a marked improvement in the supply, but there are still complaints of lack of pressure. Many obstructions in the form of roots of trees were found in the pipes taken up and it is possible that this trouble exists in other places.

The pipe line was laid over 30 years ago and it has outlived its useful life. The existing water supply system of Dehra Dun badly requiries overhauling and this is not possible until there is some other alternative source of supply to draw on. There is such a scarcity of water in the summer months that further investigations on this pipe line are not possible, for if the supply is turned off for even a short period complaints are so numerous that pressure is brought to bear for the supply to be resumed.

Expenditure during the year has amounted to Rs.14,108.

DRAINAGE

Lakhi Bagh drainage (*Rs.*0·63 *lakhs*)—This is a part of the western portion of the town which badly requires drainage.

The project provides for K. and C. drains and the paving and metalling of all lanes and roads in the area, together with sewers required to carry off the sullage to the existing outfalls.

The estimated cost of the scheme amounts to Rs.63,385 and the project has been submitted for sanction.

Sewage farm extension (*Rs.*0·16 *lakhs*)—A project for this was prepared some years ago, but the work could not be taken up as the municipal board had not acquired the land—Twenty acres of land have since been acquired and it has been necessary to revise the project. The revised estimate amounts to Rs.16,166 and has been submitted for sanction.

Infectious Diseases Hospital—This work was completed a few years ago and out of the savings the board desired to electrify the buildings. An estimate has been prepared amounting to Rs.1,143 and the Board of Public Health has sanctioned the utilization of the surplus funds for the purpose.

DEORIA.

Drainage (*Rs.*0·24 *lakhs*)—The Notified Area Committee have approved the forecast of cost for drainage improvements. The Committee have already some funds in hand and hope to be able to finance the work by a loan from Government and a grant-in-aid from the Board of Public Health. The preparation of detailed proposals are now in hand.

DEWA (DISTRICT BARA BANKI).

Temporary water supply during fair, 1933 (*Rs.*0·02 *lakhs*)—This work was undertaken at very short notice on behalf of the Dewa Fair Committee by Messrs. Noorullah Ghazanfarullah, the contractors for the distribution system of the main scheme. An undertaking was given to provide a temporary supply for the period of the *mela* on payment of an additional sum of Rs.1,200. The work was completed in time and the supply was satisfactorily maintained for the period required.

Dewa Fair water supply (*Rs.*0·53 *lakhs*)—The work is intended to afford a supply of water to the people attending the annual fair at Dewa. A tube-well together with a length of about 1,300 feet of C. I. distribution mains was completed in 1932–33, and contracts as follows for the remaining works have been given :—

Contract no. I for plant and the elevated reservoir to Messrs. Jossop & Co., Calcutta. The plant consisting of an oil engine driven air lift pump has been brought to the site and the elevated reservoir including staging has been erected. Contract no. II for distribution system and engine house to Messrs. Noorullah Ghazanfarullah. All pipe lines, standposts, pilgrim tanks and engine house have been completed. The erection of the cattle troughs has been delayed, as the sites for these were not handed over by the Secretary, Dewa Fair Committee, in time. The work should, however, be completed by June, 1934.

Dewa Fair (*District Bara Banki*) *electric supply* (*Rs.* 0·21 *lakhs*)—A forecast for this was prepared in consultation with Khan Bahadur Chaudhri Rashid Uddin Ashraf, Taluqdar of Paisar and the Secretary, Dewa Fair Committee; it provides

DEWA (concld.).

for permanent plant and fittings for lighting the whole of the *mela* area and the main road leading to the Durgah. The proposals have been forwarded to the Secretary, Dewa Fair and Exhibition Association, and are under consideration by the Exhibition Committee.

Dewa Town water supply and irrigation of agricultural farm (*Rs.* 0·12 *lakhs*/0·09 *lakhs*)—A forecast of cost for the supply of water for domestic and irrigation purposes has also been forwarded to the Dewa Fair and Exhibition Association for consideration.

FATEHPUR-SIKRI.

Water supply maintenance—The water supply functioned satisfactorily during the year. There was a tendency for the yield of the tube well to fall off during the last three dry years, but the rains this year have improved matters.

The collection of water tax is very poor; the arrears amounting to 61 per cent.

FYZABAD.

Water supply maintenance—The water supply is insufficient to meet the demand. Only three wells out of the four at the old station are working and the average total discharge is only about 250 gallons per minute. The discharge of the 5th well was affected by a length of air pipe dropping down the tube. Eventually it was recovered and re-fitted and the well continued to operate satisfactorily for some months, the yield being nearly the same as that obtained at the official test. Suddenly the discharge decreased by 10 per cent. and the reason for this has not yet been ascertained. The opening out of the well cannot be taken in hand until the new well now under construction is working, as the water supply to the town would be reduced to a figure of less than 250 gallons per minute.

The plant has worked satisfactorily during the year, but sooner or later a thorough overhaul of the Diesel engines will be necessary and the board would be well advised to ask the makers to do this.

Water supply (*Rs.* 0·58 *lakhs*)—The main works in connexion with the water supply extension were completed and handed over to the municipal board in 1931. Later a supplementary estimate was prepared for the work in connexion with the repairing and changing the position of the existing Venturi meter and improving the drainage arrangements at the new pumping station. These works were completed in February, 1933, leaving a balance of Rs. 2,735.

At the request of the municipal board, a second supplementary estimate amounting to Rs. 2,537 was prepared for utilizing the savings on sundry works, such as the construction of a boundary wall at the 5th tube well and the provision of a recording pressure gauge. These works have also been completed and the accounts will be closed in April, 1934.

The municipal board are contemplating an extension to their distribution system also but this cannot be undertaken until more water is available.

Fyzabad water supply—New tube well near existing tube well no. 3 (*Rs.* 0·13 *lakhs*)—The yield from the existing tube well no. 3 has steadily decreased and the masonry steining is also damaged, so the board have decided to construct a new well in its place. Tenders have been invited and the contract given to Messrs. Scott and Saxby, Limited. A boring was taken down to a depth of 200 feet and the strata judged suitable for the installation of a gravel feed type of well and this is under construction.

GHAZIPUR.

Water supply (*Rs.* 1·50 *lakhs*)—The tube well recently sunk having proved successful, the board have asked for detailed proposals to be prepared for a water supply scheme and this work is in hand.

Trial tube well (*Rs.* 0·12 *lakhs*)—An estimate for a tube well was prepared in 1931-32, but for want of funds it could not be constructed. The Board of Public Health gave a grant of Rs. 18,000 in March, 1933, and the work was taken in hand during the year. Boring was carried down to 350 feet below ground level and suitable water bearing strata for a strainer type well was found. The tube well has been successfully completed and on test a discharge of about 400 gallons per minute with a depression head of about 16 feet was obtained.

GORAKHPUR.

Drainage (*Rs.* 1·03 *lakhs*)—The storm water drain was completed and handed over to the municipal board in September, 1933, in good order. The maintenance of the drain, which forms Part II of the contract, was taken in hand from the date of handing over. During the construction of the main works the completion of the katcha cut at the tail end had to be postponed as the land could not be acquired in time. It is understood that the municipal board have now taken steps to acquire the land and the completion of the work will be taken in hand when funds are made available.

HARDWAR.

Water supply maintenance—The supply was maintained in good order throughout the year and the pumping plant functioned satisfactorily and gave no trouble.

The revenue, including the annual subsidy of Rs. 30,000, amounted to Rs. 50,377. The maintenance costs were Rs. 41,546, so that a profit of Rs. 8,831 was realized.

The daily consumption now averages 22·33 gallons per head.

The water supply is well managed and effective control is exercised over the distribution by the board.

Water supply improvements—Installation of a fourth tube well (Rs 0·55 lakhs)—As reported last year, a further well is required to augment the existing water supply. Estimates for sinking a tube well and laying an 8 inch main were sanctioned and this portion of the work has been carried out.

Now that the yield of the tube well has been ascertained the construction of a pump house and installation of pumping machinery is necessary to complete the scheme.

A fair project amounting to Rs.54,836 embodying all the work required in this connexion has been prepared and sanctioned and tenders are being invited.

Expenditure during the year has amounted to Rs.3,616.

Chlorination plant (Rs.0·13 lakhs)—The town's supply is obtained from three percolation wells and during the rains the results of the bacteriological analyses are not always satisfactory. Chlorination is, therefore, indicated and a forecast of cost amounting to Rs.13,000 for the installation of suitable apparatus has been prepared and approved and a fair project is now under preparation.

Town planning scheme (Rs.0·96 lakhs)—Preliminary proposals for the town planning of Bhopatwala were prepared some time ago and the training of Bagh Rao forms part of these proposals.

Owners of adjoining property have encroached upon the Rao bed beyond the limit fixed by this Department in the preliminary proposals. The municipal board have now asked the 1st Division to prepare a fair project, which will definitely fix the alignment beyond which encroachments will not be allowed. The estimate is in hand and it will be ready shortly. It will include a reinforced concrete bridge to enable traffic to cross the Rao.

Reinforced concrete bridge at Har-ki-pairi (Rs.0·12 lakhs)—In connexion with the project for the improvement of Har-ki-Pairi, a reinforced concrete bridge was proposed to connect the island platform to the Jammu steps. The bridge was estimated to cost Rs.12,000 and a sum of Rs.10,000 has been privately contributed towards the cost.

A tender has been accepted and the work will be started from the 1st April, 1934.

Additions to the Infectious Diseases Hospital (Rs.0·25 lakhs)—This work has been completed and handed over to the municipal board. As the Forest Department demanded a very high price for the land upon which the municipal board proposed to build the mortuary and the smallpox ward, the work was much delayed, and the two buildings in question had eventually to be constructed within the existing hospital compound.

Expenditure during the year has amounted to Rs.23,636.

Drainage (Rs.8·15 lakhs)—The Ganga Mahasabha met in Hardwar in November, 1933, and the drainage scheme was explained to the members present by the staff of the 1st Division. The scheme was not objected to, provided suitable arrangements can be made for preventing the discharge of raw sewage into the Ganges.

The municipal board have deposited the requisite fees for the preparation of a project for a sewage farm and this will now form an integral part of the drainage scheme. Government have also agreed to the work being taken in hand and steps are being taken to revise the first instalment of the drainage scheme to enable it to fit in with the conditions under which it will now be required to function.

The progression of the scheme now depends on a decision being arrived at in regard to the best method of crossing the Ganges canal at Mayapur and the Irrigation Department have submitted proposals for a sewer to be constructed under the canal.

The municipal board have asked for proposals to be put up for the construction of several water-flushed latrines in the town. The idea is laudable, but as things are at present, the only outlet is the river and this is objectionable, so the board have been advised to delay the construction until the new drainage scheme becomes an accomplished fact.

Temporary water supply to Adh Kumbh Mela (Rs.0·07 lakhs)—As the fourth tube well could not be completed in time in spite of strenuous efforts, it was decided to augment the existing water supply, if insufficient, by the installation of a steam pump to be installed in an existing open well in the Jatrian Parao. The well was

HARDWAR—(*contd.*).

cleaned out, but the bacteriological analyses of the water obtained were not satisfactory and no improvement became evident in spite of repeated cleaning. However the plant was kept ready for emergencies and dismantled after the *mela* was over.

Water supply extension, fourth tube well at Mayapur (Rs.0·14 lakhs)—This work has been completed. On account of the boulder and rock sub-stratum the sinking of a tube well in this locality has never been attempted before. But due to the efforts of Messrs. Scott and Saxby the work in spite of many difficulties was successfully completed. The well has been taken down to a depth of 150 feet, and on test gave a yield of 320 gallons per minute with a depression head of about 30 feet.

HATHRAS.

Water supply construction (Rs.3·90 lakhs)—The construction of the new water supply work was taken in hand during the year. The work has been split up into two contracts, viz.—

No. 1—For the supply and erection of pumping plant, which is being carried out by Messrs. Jessop & Co. of Calcutta, and

No. 2—For the supply and laying of water mains, the construction of a storage reservoir and the erection of buildings. This portion of the work is being carried out by Messrs. Noorullah Ghazanfarullah.

The work is well in hand and the expenditure during the year has amounted to to Rs. 1,72,596.

JAUNPUR.

Water supply (Rs 4·11 lakhs)—A detailed project was sanctioned by the Board of Public Health in March, 1933, for the above and during the year contract documents were prepared and tenders invited for the first instalment estimated to cost Rs.1·70 lakhs.

The work has been divided into four contracts, namely,—

No. 1, for the pumping plant and generating plant; no. 2, for the building work including the intake well, distribution system and filter house; no. 3, for the pressure filters and no. 4, for steel storage tanks.

Contract no. (1) has been placed with Messrs. Greaves Cotton & Co., no. (2) with Messrs. Martin & Co., no. (3) with the Jewell Export Filter Co. and no. (4) with Messrs. Noorullah Ghazanfarullah of Allahabad, and the work is in hand.

It is expected that the licence for the electric supply to the town will be given to Messrs. Callendars of Bombay, and if this comes about it will simplify matters and reduce the capital cost of the scheme, as electric current will be available for driving the pumping plant and auxiliary plant and the board need not put down their own generating station.

Some delay has taken place in the acquisition of land required for the erection of storage tanks and filter house.

Drainage (Rs.1·00 lakhs)—An underground drainage system was constructed many years ago but owing to there being no water available for flushing, all the drains are choked up. An investigation is being made and a forecast of cost is being prepared for a re-organization of the system.

JHANSI.

Water supply maintenance—There is a great shortage of water within the area of supply and the quality of water supplied is also unsatisfactory. The pumping plant is old and inefficient and it is time it was replaced by a more up-to-date and efficient plant, so that the chances of breakdown may be minimized and more water made available.

The rising main and distribution system should be attended to and proper precautions taken to prevent the waste. Methods of dealing with this and other problems have been dealt with in a recent report of the Mechanical Engineer for water-works.

Water supply extensions (Rs. 0·45 lakhs)—Proposals for the construction of a service reservoir including chlorination plant have now been sanctioned and tenders have been invited. This scheme will improve the conditions of supply within the City area only, and a similar scheme should be proceeded with in order to improve the supply to the Civil Lines. In the meantime the water should be chlorinated in order to protect the community against water-borne diseases.

KANAUJ.

Drainage Block "E" (Rs. 0·15 lakhs)—This work forms part of the comprehensive drainage scheme of the town. The municipal board were unable to deposit the necessary funds according to the programme submitted to them and also insisted on constructing the work without acquiring *chabutras* to widen the roads as provided for in the sanctioned project; this was not approved by the Board of Public Health and the work was not undertaken, although tenders were received.

KHAGA (DISTRICT FATEHPUR).

Five feet masonry well in the compound of Post Office (Rs.0·02 lakhs)—An estimate was drawn up for this at the request of the Divisional Engineer, Telegraphs, Agra Division, and provides for the construction of a 5-feet diameter masonry percolation well to meet the requirements of the postal staff living in the compound of

the post office at Khaga. Funds not being available for the construction this year, a demand is being made for the inclusion of same in the next year's budget. KHAGA—(*concld.*).

Water supply maintenance—The pumping plant at both Gaughat and Aishbagh is now in a better condition than it was a year or two ago, when it was touch-and-go as to whether there would not be a complete breakdown of the supply. Even so, the condition of the plant is far from perfect, and unless constant and unremitting care is given to it, it will shortly be necessary to spend considerable sums on replacements. LUCKNOW.

There is great water shortage even in the cold weather in many of the districts farthest away from the water-works, and there is no doubt that the board are not fulfilling their moral and perhaps legal obligations in regard to the consumers in these areas.

The Cantonment authority has now decided to have its own independent supply and has given six months' notice to the board to terminate the agreement now in force. On inquiry it was reported that the water received was considered unfit for domestic consumption and in consequence it had to be re-chlorinated before issue within Cantonment limits. The municipality has, therefore, lost its most profitable consumer and a yearly income of approximately Rs. 60,000.

It is also understood that the East Indian Railway are considering the question of supplementing the town supply, as there is much dissatisfaction with the limited quantity now forthcoming from the municipal mains.

It has been pointed out by the Mechanical Engineer for Water-works in his recent report that the capacity of the water-works is totally inadequate to meet the present demand and unless drastic steps are taken to reduce waste and excessive consumption on the part of favoured consumers, a large capital expenditure will be necessary on extensions and even then it is doubtful if the desired results will be attained.

Water supply extension (Rs.0·83 lakhs)—The board have installed a third pumping set of 10,000 gallons per minute capacity at Gaughat and this should enable the existing sets to be overhauled regularly and enable sufficient standby to be maintained. The old sets at Gaughat operate under adverse conditions, as the suction lift in the dry weather when the river is low is excessive.

It is understood that the board are contemplating proceeding with the construction of a third clear water reservoir and the installation of an additional pumping set at Aishbagh. These extensions, however, will not have much effect on the general conditions; the districts which are favourably situated will benefit most and the consumption in these areas, which is already high, will tend to increase, as the board do not favour the installation of meters which would limit consumption and enable the supply to be controlled.

Maintenance of Gumti weir (Rs.0·01 lakh)—The weir has been satisfactorily maintained during the year.

Anti-malarial and drainage works, Ghaziuddin Hyder Canal (Rs.0·07 lakhs)—This work has been satisfactorily maintained. Some very necessary inlets have been constructed and estimates for others have been prepared and submitted to the authorities concerned for consideration.

An estimate for a crossing over the canal lining for the convenience of the inhabitants living in the adjacent villages was prepared and sanctioned and the work completed during the year.

Installation of lavatories and sanitary fittings in Chief Engineer, Public Works Department, Buildings and Roads Branch, and Superintending Engineer, Public Health Department's offices (Rs. 0·07 lakhs)—The estimate was prepared at the request of the Public Works Department and tenders invited, and the main portion of the work was completed before the close of the financial year.

Lucknow Central Jail—Installation of an electro-motor centrifugal pumping set (Rs.0·06 lakhs)—The water supply arrangements have been inspected and proposals put up for replacing the existing kite motion pumps, which are worn out, by electro-motor pumps. A forecast of cost for this has been submitted to the Superintendent.

Water supply maintenance—The mechanical plant is now extremely old and most of it should be replaced by something more up-to-date, as otherwise it will be a continual source of trouble, besides being very costly to maintain. MEERUT.

One turbine has been thoroughly overhauled by the Water-works Superintendent and is operating satisfactorily. The other set now requires overhauling and the Water-works Superintendent has been advised to take this in hand.

The relations between the Water-works Superintendent and certain members of his staff have not been good, and as the water supply might have suffered in consequence an inquiry was ordered to be held by the Executive Engineer, 1st Division,

MEERUT—(concld.). Public Health Department. His report has been forwarded to Government and in due course will reach the board.

During the rains the bacteriological results of the water supplied were not satisfactory and the board were advised to instal a chloronome. This has been obtained and is now in operation.

There is a great shortage of water in certain areas and advice has been tendered on ways and means of improving the supply. The tube well which was constructed about the year 1920 has never been brought into use, and it has been suggested that this well should be tested as to yield, as some water may be available from this source.

A tube well is required in the Civil Lines as in this area a good many consumers get little or no water. There is no doubt that the main cause of the insufficiency in the supply is due to the waste of water which is taking place in the lowlying areas, and if rigorous steps were taken to control and limit consumption by the installation of meters, conditions would be greatly improved.

This board are in a most advantageous position : the original loan has been paid off and so far they have not incurred any further loan commitments. The district is also eminently suitable for the construction of tube wells, and if the board exerted themselves they could with a comparatively small capital expenditure give an ample supply of water to every consumer in municipal limits.

MIRZAPUR. *Water supply maintenance*—Recent analyses have shown that the supply at times is not satisfactory. There are also complaints of water shortage in certain areas of the town. There is no doubt that if the supply was properly controlled that there would be a sufficiency of water for every one. The board have under consideration a scheme for installing a booster pump to enable an increased quantity of water to be obtained from the Tanda storage reservoir. On investigation it was not thought advisable to recommend this scheme until the board had accurate figures available as to the actual consumption. The Venturi meter has been out of use for many years and there is no reason at all why this should not be fixed, so that the required information can be obtained. It is useless increasing the supply until steps have been taken to reduce waste and excessive consumption, as the benefit would be apparent for a short time only.

There are far too many standposts in the town and many of them are leaky and badly maintained. The number should be reduced by 33 per cent, and the balance equipped with suitable type of waste-not cock.

The board have submitted a scheme for the approval of Government for the introduction of water charges on a ferrule basis. If this is introduced there should be some increase in revenue and more funds should be available for improvements which are badly needed.

The board would be well advised to revert to their original practice of having a wholetime Water-works Superintendent instead of combining the post with that of Executive Officer.

MUSSOORIE. *Water supply maintenance*—The plant at all the four pumping stations has been maintained in good order. Sufficient spares are carried and the necessary running repairs were undertaken during the year.

The distribution system was satisfactorily maintained and is now under the control of the Electrical Engineer.

There is now some demand for water-flushed closets, which will increase when the drainage system is remodelled, and the problem of the water supply will become accentuated. Now at the height of the season, that is before the break of the rains, the discharge of the various springs feeding the different pumping stations falls to a minimum and the supply available is barely sufficient to meet the demand. It would, therefore, be advisable to explore other sources of supply, for as things are at present, it is extremely doubtful if a comprehensive drainage scheme would function properly or fulfil its purpose with the restricted amount of water now available in the summer months.

Hydro-electric supply—The operation of the power station at Galogi from the point of view of continuity of the supply was satisfactory, but the defects referred to in last year's report still remain in spite of the fact that the urgency of the renewals required has been repeatedly pointed out to the board by their Electrical Engineer and by Inspecting Officers of this Department.

The state of the hills above the power pipe line is a continual source of anxiety during the monsoon.

The fissures above the motor road at "Galogi Dang" continue to develop, but the greatest danger is from hills on the west along the foot of which the power pipe line runs.

The Diesel Generating Station at Dehra Dun has been in operation continuously during the summer months at time of peak load. This station also carried the

combined loads of Mussoorie and Dehra Dun during the time power was not available from Galogi due to the fitting of the new power pipe line, distributors and receivers. The annual inspection of the plant by the makers has not yet been carried out. The plant is generally in good condition but a large number of spares are required and the cooling system requires replacement. MUSSOORIE—(contd.)

Hydro-electric extensions :—This work is being carried out by the board's officials. No. 2 sedimentation tank has been completed with the exception of no. 2 Hump and has been brought into service as a storage tank. Progress on the new power pipe line has been very satisfactory; all material has been collected on site and the top and bottom distributor with valves, hatch boxes, etc., have been connected up and tested. The work at the Central Workshop has also proceeded satisfactorily and is complete, excepting the driving motors.

Drainage—For some years past the board has been carrying out small extensions to the drainage system, but the whole problem of the drainage of the extensive area under the administration of the municipal board and the disposal of sewage now requires investigation. The demand for water flushed latrines is increasing and many of the existing drains require re-alignment. It has been suggested to the board that the newly appointed Municipal Engineer, in conjunction with the Medical Officer of Health and the Executive Officer, should make a survey of the existing conditions and put up proposals for a comprehensive scheme to serve the whole station.

MOGHAL-SARAI.

Water supply (*Rs.*0·25 *lakhs*)—A forecast of cost amounting to Rs.0·33 lakhs was furnished to the Notified Area Committee. This was, however, considered beyond their means and a revised forecast of cost amounting to *Rs.*0·25 lakhs was supplied, and this is under consideration.

Drainage (*Rs.*0·32 *lakhs*)—This work was completed in December, 1932, and taken over by the Notified Area Committee. The maintenance period under the terms of the contract expired in July, 1933. The work has greatly improved the sanitary condition of the town area.

MOHAMMADPUR (BARA BANKI).

A 4" tube-well with a suitable hand pump for Police Station, Mohammadpur (*Rs.*0·02 *lakhs*)—This estimate was prepared at the request of Superintendent of Police, Bara Banki, but the work has not been taken up on account of lack of funds.

MORADABAD.

Improvement to the drainage system—(*Rs.*0·48 *lakhs*). A forecast of cost amounting to Rs.48,000 was prepared and sent to the municipal board for approval. After repeated reminders the municipal board stated that the forecast had been lost, so another copy was supplied. The matter came up before the board on the 12th December, 1933, and *vide* their resolution no. 17, they decided not to take further action.

MUTTRA.

Water supply maintenance—The plant has been well maintained and there is nothing of importance to be recorded concerning the water supply except that there is lack of pressure in some of the high zones and in certain other localities such as Sadar Bazar and Dampier Park.

The distribution system is in the form of a grid embracing both high and low zones and unequal distribution is the result. A forecast of cost has been prepared with a view to isolating certain areas in the high zone and giving these an independent supply.

Drainage—Several estimates have been supplied to the Muttra municipal board for improvement to the drainage of certain localities. The board, however, have not been able to take the work in hand owing to lack of funds.

The sewage farm continues to function satisfactorily but it is understood that some arrears in rent are outstanding.

Improvements to Infectious Diseases Hospital (*Rs.*0·04 *lakhs*)—Some cracks have appeared in the dispensary building, due most likely to some settlement, as the building was constructed on a mound and in one or two places it may not have been perfectly stable.

An estimate amounting to Rs.3,803 has been prepared with the object of preventing further settlement and it was suggested by the Assistant Director of Public Health that the savings on the Infectious Diseases Hospital, Brindaban, might be utilized for the purpose, but the Board of Public Health have not approved of the proposal as they consider the cost should be met from municipal funds.

MUZAFFARNAGAR.

New Mandi drainage—(*Rs.*4·64 *lakhs*). A portion of this scheme has been completed and handed over to the municipal board. Expenditure during the year has amounted to Rs.2,921.

The remaining portion of the Mandi is in a very bad state and almost impossible conditions have been created on account of the fact that no restrictions appear to be placed on building operations, the board apparently allowing private individuals to build as they please.

MUZAFFARNAGAR —(concluded.)

The Superintending Engineer inspected the locality on 3rd January, 1934, at the request of the Board of Public Health and submitted a report.

On account of very heavy rains this year the adjacent country was flooded and flood water found its way into the Mandi. When the intensity of the rainfall is very high, there is always a risk of flooding unless the drainage cuts are sufficiently wide to take the maximum run-off.

The drainage cuts are under the control of the Irrigation Branch, who are investigating the matter, and it is presumed that steps will be taken to minimize the risk in future.

Repairs to outfall drains (*Rs.0·50 lakhs*)—The tail end of the outfall drain of the old town was washed away sometime ago and an estimate for repairs was prepared in 1926. The board have since reported that more of the drain has been washed away. The repairs are going to be costly, so the board have been advised that it would be to their advantage to construct the portion of the drainage scheme that will intercept the drainage at present flowing into the old drain. About Rs.50,000 will be required for the purpose.

NAGLA CHAND, (MEERUT).

A 3″ tube well with a suitable hand pump in the compound of Ganges Canal inspection house (*Rs 0·02 lakhs*)—A forecast of cost for sinking a 4″ tube well with 3″ diameter Ashford strainers fitted with a suitable hand pump was prepared at the request of Sub divisional Officer, II Sub-division, Meerut Division, Ganges Canal, Meerut, but no further action has been taken in the matter.

NIDHAULI (ETAH).

Repairs to the existing well at the police station and sinking a tube well (*Rs.0·02 lakhs*)—A forecast was furnished to the Deputy Inspector General of Police, United Provinces, Allahabad, but no funds being available, the proposals have been dropped.

NAINI TAL.

Water supply maintenance—The recently appointed Electrical and Mechanical Engineer, after strenuous efforts, has succeeded in getting the plant into first class working order, and the board should be much indebted to this officer for his work in this connexion.

During the year all the pumps and motors were thoroughly overhauled and new parts fitted where found necessary. New water supply pipes for priming the suction pipes of nos. 5 and 6 pumps have also been fitted.

One of the lakeside wells has been discarded on the advice of the Medical Officer of Health. The motors of both the pumping sets have been thoroughly overhauled.

The chlorination apparatus has been maintained in good order and new parts have been fitted as found necessary. Sufficient spares are kept in stock.

The distribution system has been kept in good repair and efforts have been made to reduce waste. During the year under review 23 new connexions have been given.

Hydro-electric supply—The plant has now been thoroughly overhauled by the Electrical Engineer and it is in better condition than it has been for years. No interruption in the supply of any consequence has taken place.

The Electrical and Mechanical Engineer is very much handicapped by lack of skilled staff.

Drainage (*Rs.0·71 lakhs*)—A project modelled on preliminary proposals prepared by this department some years ago for improving the drainage of the town has been submitted by the municipal board to the Board of Public Health for approval. The project was sanctioned and the board were asked to find ways and means for financing the work.

Drainage conditions at Naini Tal are very bad and complaints are rife during the summer months of the insanitary conditions in the densely populated areas of the town. It is very necessary that immediate steps should be taken to improve matters and the Chairman and Medical Officer are aware of the position and are most anxious that something should be done; only they are somewhat doubtful if the proposed arrangements will suffice and favour a more ambitious scheme.

NAUTANWAN.

Water supply (*Rs.0·06 lakhs*)—A tube-well recently sunk here turned out on completion to be an art well, the water rising above ground level—a rare phenomenon in these Provinces. A forecast of cost amounting to Rs.6,080 for a water supply to the town area has been supplied to the Medical Officer of Health, but it would appear that there is some difficulty in providing for the annual maintenance charges.

RAMNAGAR.

Drainage (*Rs.0·45 lakhs*)—A forecast of cost for improving the drainage, which is in a very bad condition, has been furnished to the Notified Area Committee.

SAHARANPUR.

Drainage (*Rs.2·05 lakhs*)—A drainage project for this town was prepared some years ago, but the cost of the complete scheme was such that the board could not finance it and they asked that it be split up into suitable instalments.

The first instalment amounting to about Rs.2 lakhs has been approved by the board, but the work has not yet been taken in hand. SAHARANPUR —(concluded).

It appears that the Board of Public Health, vide their letter no. 591/BPH-491/23, dated April 26, 1934, to the Commissioner, Meerut Division, are willing to provide Rs.50,000 as grant in the year 1934-35 if the municipality will meet the balance of the cost.

A programme of funds has been drawn up and submitted for approval and the work will be taken in hand if the board are in a position to provide the balance of funds.

Water supply (Rs.0·32 lakhs)—A forecast of cost for a tube well, with distribution mains throughout the town, was supplied in 1933, but the board have not yet come to any decision on the matter. SANDILA.

Water supply maintenance—All three tube wells with their air pumps worked satisfactorily during the year and the pumping plant also gave little trouble. The water supply has been a great boon to the town and the number of private connexions have increased rapidly—in fact too rapidly. There is also a long waiting list of persons requiring connexions. The demand is rapidly outstripping the supply and extensions will be necessary if rigorous control is not exercised over waste and the consumption reduced. UNAO.

Water supply extensions (Rs.0·16 lakhs)—The board have made an effort to instal the meters for which a loan of Rs.10,000 was taken in the year 1931. A few meters were fixed, but on a threat from some legal minded citizens to take action in a Court of Law to test the validity of the board's procedure, work has *slowed down. No rent is charged on the meters fixed, but payment is demanded* for excess consumption over and above the free allowance.

Drainage (Rs.1·89 lakhs)—The work included in the first instalment has been finished, but as the board were able to find more funds, partly from savings *and partly from grants from the Board of Public Health, a good deal of extra* surface work has been carried out. More sewage is now being received at the pumping station and the pump can work for longer hours, and it is expected that it will be possible to bring the sewage farm into operation shortly and some revenue should then be forthcoming.

The board have promised to make available additional funds for further surface work.

The post of the Superintending Engineer was held by Mr. G. McC. Hoey, up to the 14th of September, 1933, when he proceeded on long leave and handed over charge to Mr. F. D. Tunnicliffe, who continued to officiate for the remainder of the year. The post of Personal Assistant was held by Mr. H. G. Trivedi until the 11th of September, 1933, and by Mr. K. Chattopadhya for the rest of the year. STAFF.

Mr. W. Saise continued as Executive Engineer, 1st Division, Public Health Department, Meerut, throughout the year.

Mr. F. D. Tunnicliffe held the office of Executive Engineer, II Division, Public Health Department, Allahabad, until the 11th of September, 1933, when he handed over charge to Mr. H. G. Trivedi, who continued in this office for the rest of the year.

Mr. N. D. Choudhury continued as Executive Engineer, Well-Boring Operations Division, Cawnpore, throughout the year.

Messrs. G. McC. Hoey and F. D. Tunnicliffe, successively held charge of the office of Mechanical Engineer for Water-works, in addition to their duties as Superintending Engineer, until the 4th of January, 1934, when Mr. C. W. Cassé, the officer selected by the High Commissioner for India as Mechanical Engineer for Water-works, joined and took over the office and held it until the end of the year.

Mr. N. R. Gupta worked as Assistant to the Mechanical Engineer throughout the year.

Mr. S. B. Mathur, Executive Engineer, attached to the I Division, Public Health Department, Meerut, continued on medical leave and was invalided from the service from the 2nd of January, 1934, and his post abolished from that date.

Mr. G. K. Pillai, Executive Engineer, attached to II Division, has been employed on special duty, and subject to the approval of the Secretary of State, his post will be retrenched from the 1st of July, 1934.

A post of a permanent Assistant Engineer has also been abolished.

In addition to the above, four permanent Assistant Engineers, of which the services of one will terminate from July 1, 1934, and 4 temporary Assistant Engineers, 9 Overseers, 10 temporary subordinates and the requisite number of computors, draftsmen and clerks were employed.

STAFF—
(contd.).

The Superintending Engineer and members of his staff have rendered assistance during the year to the Thomason Engineering College, Roorkee, and Lucknow University as Examiners in Engineering subjects.

The Officiating Superintending Engineer was loaned to the Government of India in November last for a period of a week to advise in conjunction with another Engineer on the drainage and sewage disposal of Delhi.

The Officiating Superintending Engineer was allowed to proceed to Jodhpur in March last for a few days to advise on the water supply and drainage of the city of Jodhpur.

The Officiating Superintending Engineer was also permitted by the local Government to serve on the Advisory Council of the Thomason Engineering College, Roorkee, as a representative of the Institution of Civil Engineers.

F. D. TUNNICLIFFE,

M.C., ASSOC. M. INST. C.E.,
Offg. Superintending Engineer,
Public Health Department,
United Provinces.

LUCKNOW:
July 21, 1934.

APPENDICES

APPEN

Statement of operations of various water-works

Item number	Particulars	Agra	Allahabad	Benares	Cawnpore	Lucknow	Meerut	Mussoorie	Naini Tal
	Population.								
1	By census of 1931 in municipality.	205,487	173,895	201,037	219,189	251,097	91,181	11,040	13,558
2	By census of 1931 in cantonments.	24,277	10,019	4,278	24,566	23,562	45,528	2,017	1,233
3	Inhabitants drawing their supply from mains.	229,764	183,914	205,315	243,755	218,000	91,181	13,057	14,791
	Consumption of water.								
4	Metered supplies—								
	(a) Cantonments, million gallons.	157·621	71·347	1·115	6·961	135·600	Nil	5·379	2·700
	(b) Trade, million gallons ..	50·905	20·906	2·372	317·141	115·449	11·750	Nil	0·201
	(c) Domestic (bungalows, etc.), million gallons.	80·465	25·663	36·819	423·832	123·011	2·702	45·400	16·675
	(d) Buildings, million gallons	1·827	9·200	27·174	54·511	44·534	0·427	Nil	0·087
	Total Metered supplies, million gallons.	290·818	133·116	67·480	802·445	418·684	14·879	50·779	19·663
5	Unmetered supplies—								
	(a) Domestic (assessment or ferrute), million gallons.	962·590	1,628·986	1,986·597	1,763·690	1,404·095	282·618	12·998	25·517
	(b) Municipal purposes (road watering, irrigation and flushing, etc.), million gallons.	175·951	44·453	199·542	362·277	585·623	3·387	17·330	9·898
	(c) Standposts, million gallons	267·932	400·077	496·649	247·369	818·296	199·728	51·991	6·379
	(d) Buildings, million gallons	2·219	16·018	5·995	6·519	0·795	Nil	4·333	0·039
	Total Unmetered supplies, million gallons.	1,409·092	2,089·534	2,688·783	2,384·855	2,808·749	485·733	86·652	41·833
6	Total quantity supplied during the year (items 4 and 5), million gallons.	1,708·910	2,222·650	2,756·263	3,187·300	3,227·433	500·612	(a)137·431	(b)61·496
7	Daily average supply, million gallons.	4·682	6·089	7·551	8·732	8·842	1·372	0·377	0·168
8	Maximum daily average in any one month, million gallons.	6·118	7·038	7·895	10·787	9·445	1·438	0·464	0·220
9	Maximum supply on any one day during the year, million gallons.	6·250	7·960	11·301	11·550	12·454	1·624	Not available.	0·273
10	Consumption per head per day for trade alone, gallons.	0·61	0·40	0·03	3·56	1·45	0·35	Nil	0·04
11	Consumption per head per day municipal purposes and buildings, gallons.	2·15	1·04	3·11	4·76	7·93	0·11	4·55	1·85
12	Consumption per head per day for Domestic purposes, gallons	17·62	31·67	33·64	27·50	31·18	14·58	24·29	9·50
13	Total consumption per head per day (items 10, 11 and 12), gallons.	20·38	33·11	36·78	35·82	40·56	15·04	28·84	11·39
14	Hours of daily supply ..	9·75	15·00	9·81	16·90	18·50	18·61	24·00	24·00
15	Total hours of pumping during the year.	9,209·00	13,453·33	6,413·65	15,146·00	13,328·42	6,794·50	14,111·25	3,849·33
	Lift of pumps.								
16	From river to settling tanks, feet.	46·49	133·16	89·74	37·89	119·64	15·16	Murray 1,611·50 Mackinon 639·00 Bhilaru 1,365·68	H. Z. 1,163·48 I. Z. 458·64 L. Z. 259·75
17	From filtered water pumps to town distribution, feet.	140·95	111·25	95·45	93·80	75·87	131·43		
18	Total lift, feet	187·44	249·41	185·19	131·69	195·51	146·59	Average 1,354·64	Average 390·94
19	Total water horse power hours during the year in million.	1·22	1·25	1·38	1·51	1·24	0·33	0·94	0·12

(a) Includes gravity supply 4·730 million gallons.
(b) Ditto 19·036 ditto.

DIX A.

in the United Provinces for the year 1933-34.

Dehra Dun	Jhansi	Mirzapur	Muttra	Fyzabad	Hardwar	Unao	Kosi	Fatehpur Sikri	Aligarh	Almora
40,409	64,591	61,184	60,590	59,992	33,287	16,282	7,294	6,908	83,873	8,715
9,721	12,121	Nil	3,439	5,726	Nil	Nil	Nil	Nil	Nil	Nil
40,409	40,255	42,700	59,441	35,000	11,535	13,000	7,294	6,152	35,000	8,715
Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
0·149	0·962	4·339	1·564	Nil	0·172	Nil	0·785	Nil		
9·871	2·140	Nil	1·320	§ 11·996	1·354	1·639	0·435	0·022		
* 0·163	0·147	Nil	0·440	0·663	1·062	Nil	Nil	Nil		
10·183	3·249	4·339	3·324	12·664	2·588	1·639	1·170	0·022	Nil	Nil
99·817	4·119	211·123	98·661	92·596	48·675	56·195	Included in 5(*a*)	Nil	68·363	Nil
	1·788	52·253	20·154	15·520	2·637	Nil	0·184	Nil	2·355	Nil
	57·899	81·145	120·315	75·760	39·919	Included in 5(*a*)	21·171	14·561	34·601	33·638
	Nil	9·353	5·169	0·536	0·428	Nil	0·234	Nil	Nil	Nil
99·817	63·796	353·874	244·299	184·412	91·659	56·195	21·589	14·561	100·319	33·638
110·000	67·045	358·263	247·623	197·076	94·247	57·834	22·759	14·583	100·319	33·638
0·301	0·184	0·982	0·678	0·540	0·258	0·158	0·062	0·040	0·275	0·032
0·435	0·230	1·047	0·838	0·616	0·426	0·194	0·081	0·054	0·345	Not available.
Not available.	0·315	1·076	0·958	0·758	0·527	0·225	0·113	0·110	0·509	Do.
0·01	0·07	0·28	0·07	Nil	0·04	Nil	0·28	Nil	Nil	Nil
7·45	0·13	3·95	1·19	1·31	0·98	Nil	0·16	Nil	0·18	Nil
	4·36	18·75	10·15	14·12	21·36	12·19	8·11	6·49	7·67	10·57
7·46	4·56	22·98	11·41	15·43	22·38	12·19	8·55	6·49	7·85	10·57
24·00	9·49	19·00	7·80	8·37	12·00	10·00	10·00	6·00	4·22	24·00
Nil	3,461·00	Nil	4,306·92	11,951·17	10,492·00	4,570·00	3,010·50	2,293·00	11,284·41	Nil
Gravity supply.	219·08	Gravity supply.	D. C. set 140·25 A. C. set, 161·90 5th well 205·40	Old pump 113·53 New pump 140·46	177·14	130·00	111·15	207·62	147·10	Gravity supply.
Gravity supply	219·08	Gravity supply.	Average 158·59	Average 126·97	177·14	130·00	111·15	207·62	147·10	Gravity supply.
..	0·07	..	0·20	0·13	0·08	0·04	0·01	0·02	0·07	..

§ Includes 0·137 million gallons supplied to Post Office in cantonment.
* For municipal purposes.

APPE

Statement of operations of various water-works

Item number	Particulars	Agra	Allahabad	Benares	Cawnpore	Lucknow	Meerut	Mussoorie	Naini Tal
	Supply connexions.								
	Unmetered—								
20	Number of connexions made during 1933-34.	166	375	557	715	679	70	Nil	Nil
21	Total number of connexions..	5,612	7,370	17,034	11,311	12,802	2,056	34	7
	Metered—								
22	Number of house connexions made during 1933-34	13	6	170	204	35	2	127	19
23	Total number of house connexions.	159	396	256	2,031	440	21	735	382
24	Number of trade connexions made during 1933-34.	7	Nil	Nil	4	10	3	Nil	4
25	Total number of trade connexions.	128	45	47	143	110	25	Nil	20
26	Total number of metered connexions (items 23 and 25).	287	381	303	2,174	550	46	735	402
	Annual charges and cost of water supplied.								
27	Maintenance charges, Rupees	1,64,057	2,43,393	2,16,549	3,01,609	(a)3,59,432	30,458	(b)89,385	(c)45,878
28	Interest and sinking fund charges. „	65,329	1,46,212	88,090	84,522	1,57,323	Nil	41,125	25,589
29	Total charges „	2,29,986	3,89,605	3,04,639	3,86,131	5,16,755	30,458	1,30,510	71,467
30	Cost per 1,000 gallons per 100 feet lift. Annas	0·84	0·70	0·68	1·15	0.91	0·66	0·77	3·05
31	Cost per 1,000 gallons maintenance charges. „	1·54	1.75	1·26	1·52	1·78	0·97	10·40	11·93
32	Cost per 1,000 gallons interest and sinking fund charges. „	0·61	1·05	0·51	0·17	0·78	Nil	4·79	6·66
33	Total charges per 1,000 gallons (items 31 and 32). „	2·15	2·80	1·77	1·69	2·56	0·97	15·19	18·59
	Income from water-works.								
34	Unmetered—								
	(a) Water rate recovered (assessment or ferule). Rupees	1,85,488	3,62,238	3,07,030	4,33,201	3,80,353	29,446	11,769	43,297
	(b) Amount credited to water-works for water used for municipal purposes. „	21,993	36,000	49,875	Nil	73,000	2,000	Nil	11,320
	(c) Buildings and other receipts. „	4,626	16,659	20,080	11,095	(d)36,264	451	1,205	1,786
	Total .. „	2,12,107	4,14,897	3,77,045	4,44,296	4,89,617	31,897	12,974	56,403
35	Metered—								
	(a) Sale of water by meter. „	98,460	60,352	29,497	1,50,808	1,49,161	5,455	74,941	28,389
	(b) Meter rent .. „	2,998	4,825	3,339	19,676	7,223	177	3,060	2,577
	Total .. „	1,01,458	65,177	32,836	1,70,484	1,56,384	5,632	78,001	30,966
36	Total income (items 34 and 35). „	3,13,565	4,80,074	4,09,881	6,14,780	6,46,001	37,529	90,975	87,369
	Income and working charges.								
37	Receipt per 1,000 gallons supplied through meter. Annas	5·41	7·83	7·73	3·40	5·98	6·06	24·58	25·20
38	Receipt per 1,000 gallons supplied through assessment rating. „	2·41	3·18	2·24	2·98	2·79	1·05	2·40	21·37
39	Receipts per 1,000 gallons on total consumption. „	2·93	3·45	2·38	3·09	3·20	1·20	10·59	22·73
40	Profit or loss per 1,000 gallons supplied. „	Profit 0·73	Profit 0·65	Profit 0·61	Profit 1·40	Profit 0·64	Profit 0·23	Loss 4·60	Profit 4·14
41	Profit or loss on years working. Rupees	„ 88,579	„ 90,460	„ 1,05,242	„ 2,73,649	„ 1,29,246	„ 7,071	„ 39,535	„ 15,902

(a) Includes Rs.55,990 debited to water-works for cost of services rendered by other departments of the municipality.
(b) Includes Rs.51,339 debited to water-works for cost of electric energy.
(c) Includes Rs.24,398 debited to water-works for cost of electric energy.
(d) Includes Rs.25,000 Government subsidy.

DIX A—(*concluded*)

the United Provinces for the year 1933-34.

Dehra Dun	Jhansi	Mirzapur	Muttra	Fyzabad	Hardwar	Unao	Kosi	Fatehpur-Sikri	Aligarh	Almora
Nil	7	86	73	60	17	Nil	Nil	Nil	23	Nil
1	129	2,846	1,997	1,385	230	214	4	Nil	673	Nil
3	1	Nil	25	2	17	23	15	2	Nil	Nil
51	11	Nil	35	46	22	31	26	2	Nil	Nil
Nil	Nil	Nil	12	Nil	Nil	Nil	2	Nil	Nil	Nil
2	2	9	33	Nil	2	Nil	5	Nil	Nil	Nil
53	13	9	63	46	24	31	31	2	Nil	Nil
8,648	21,177	4,086	44,189	29,454	(*e*)30,122	10,449	6,616	2,560	26,956	3,019
12,872	Nil	10,602	18,350	11,426	11,424	1,408	Nil	Nil	38,282	6,678
21,520	21,177	14,688	62,539	40,880	41,546	11,857	6,616	3,560	65,238	9,697
Nil	2·31	Nil	1·80	1·88	2·38	2·22	4·18	1·38	2·92	Nil
1·26	5·05	0·18	2·85	2·39	5·11	2·39	4·65	3·90	4·30	1·43
1·87	Nil	0·48	1·19	0·93	1·94	0·39	Nil	Nil	6·10	3·18
3·13	5·05	0·66	4·04	3·32	7·05	3·28	4·65	3·90	10·40	4·61
Nil	21,484	28,309	78,215	39,652	16,588	8,653	7,323	1,242	15,192	445
324	1,000	Nil	7,266	2,500	1,000	Nil	37	Nil	Nil	Nil
4,591	405	1,024	3,982	1,491	(*f*)30,652	278	340	Nil	591	43
5,415	22,889	29,333	84,463	43,643	48,235	8,931	7,760	1,242	15,783	488
(*g*)13,489	1,222	4,332	996	1,486	1,945	1,175	152	Nil	Nil	Nil
58	83	56	338	473	197	64	54	Nil	Nil	Nil
13,547	1,305	4,438	1,334	1,959	2,142	1,239	206	Nil	Nil	Nil
18,962	24,194	33,771	85,797	45,602	50,377	10,170	7,966	1,242	15,783	488
21·29	6·43	16·18	6·43	2·47	13·24	12·09	2·82	Nil(*h*)	Nil	Nil
0·87	5·74	1·38	5·53	3·79	8·42	2·54	5·75	1·36	2·52	0·23
2·76	5·77	1·51	5·54	3·70	8·55	2·61	5·60	1·36	2·52	0·23
Loss 0·37	Profit 0·72	Profit 0·85	Profit 1·50	Profit 0·38	Profit 1·50	Loss 0·46	Profit 0·95	Loss 2·54	Loss 7·88	Loss 4·38
„ 2,558	„ 3,017	„ 19,083	„ 28,258	„ 4,722	„ 8,831	„ 1,637	„ 1,350	„ 2,318	„ 49,455	„ 9,209

(*e*) Includes Rs.20,725 debited to water-works for cost of electric energy.
(*g*) Includes Rs.420 income for supplying 0·163 million gallons of water for municipal purposes.
(*f*) Includes Rs.30,000 from fair funds.
(*h*) No revenue realized from the metered connections.

APPENDIX B

Statement showing total demand, amount recovered, remissions and arrears of various water-works in the United Provinces during the year 1933-34

Water-works Stations	Total demand	Total amount recovered	Total amount of remissions	Arrears on 31st March, 1934		Remarks
				Total amount	Percentage	
	Rs.	Rs.	Rs.	Rs.		
1. Agra ..	5,04,303	3,13,565	10,792	1,79,946	35·68	
2. Allahabad ..	5,30,827	4,80,074	3,733	47,020	8·86	
3. Benares ..	5,32,926	4,00,831	5,254	1,17,791	22·10	
4. Cawnpore ..	7,58,796	6,14,780	27,025	1,16,991	15·42	
5. Lucknow ..	6,62,088	6,46,001	85	15,997	2·42	
6. Meerut ..	44,159	37,529	128	6,502	14·72	
7. Mussoorie ..	1,01,992	90,975	3,649	7,615	7·47	Excess recovery Rs.305. Rs.58 recovered in excess last year but credited this year.
8. Naini Tal ..	96,269	87,369	74	8,843	9·19	Excess recovery Rs.17.
9. Dehra Dun ..	19,038	18,962	..	76	0·40	
10. Jhansi ..	26,167	24,194	255	1,731	6·61	Excess recovery Rs.13.
11. Mirzapur ..	47,899	33,771	1,661	12,467	26·03	
12. Muttra ..	1,00,192	85,797	4,638	9,757	9·74	
13. Fyzabad ..	53,841	45,602	3,387	4,852	9·01	
14. Hardwar ..	51,262	50,377	..	879	1·71	Rupees 6 realized last year in excess but adjusted during the year under report.
15. Unao ..	14,331	10,170	420	4,241	28·60	
16. Kosi ..	8,886	7,966	370	550	6·19	
17. Fatehpur Sikri	3,542	1,242	136	2,164	61·10	
18. Aligarh ..	16,072	15,783	..	289	1·80	
19. Almora ..	488	488	..	..	..	
Total ..	35,73,573	29,74,526	61,607	5,37,711	15·05	

APPENDIX C

Statement showing number and size of all connexions; also number and size of metered connexions for the year 1933-34.

Name of stations	Size of connexions																		Remarks
	1/8"	3/16"	1/4"	3/8"	1/2"	5/8"	3/4"	1"	1¼"	1½"	2"	3"	4"	6"	8"	10"	12"	Other connexions	Total	
Unmetered supplies																				
Agra	1,023	..	1,085	2,798	508	..	158	72	..	14	..	1	..	..	..	..	..	..	5,612	
Allahabad	1,142	..	1,442	3,143	1,424	60	50	90	..	10	9	..	..	..	..	..	..	..	7,370	
Benares	4,105	..	10,973	1,050	906	..	..	..	..	..	..	..	..	..	..	..	..	..	17,034	
Cawnpore	..	651	5,158	2,882	1,645	8	404	440	23	93	..	..	..	..	..	..	..	*7	11,311	*Tee connexions.
Lucknow	..	..	..	10,230	2,039	108	253	157	13	7	6	..	..	..	..	..	..	..	12,802	
Meerut	..	..	..	1,599	425	..	22	10	..	..	..	..	..	..	..	..	..	..	2,056	
Mussoorie	..	..	..	..	24	..	..	..	..	..	..	..	..	..	..	..	..	..	24	
Naini Tal	..	..	..	..	1	..	2	1	1	..	..	..	..	..	..	..	..	†2	7	†2½" connexions.
Dehra Dun	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	1	
Jhansi	..	..	11	..	104	..	6	3	..	1	4	..	..	..	..	..	..	..	129	
Mirzapur	34	..	435	1,534	496	6	175	63	52	..	..	1	..	..	..	..	..	..	2,846	
Muttra	670	..	1,138	81	106	..	2	..	..	..	..	..	..	..	..	..	..	..	1,997	
Fyzabad	1,029	..	230	69	57	..	..	..	..	..	..	..	..	..	..	..	..	..	1,385	
Hardwar	94	..	53	12	71	..	..	..	..	..	..	..	..	..	..	..	..	..	230	
Unao	99	..	81	25	9	..	..	..	..	..	..	..	..	..	..	..	..	..	214	
Kosi	..	..	..	4	..	..	..	..	..	..	..	..	..	..	..	..	..	..	4	
Fatehpur-Sikri	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
Aligarh	344	248	73	8	..	..	..	..	..	..	..	..	..	..	..	..	..	..	673	
Almora	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
Total ..	3,543	899	20,629	23,485	7,806	182	1,072	836	88	125	19	2	..	..	..	..	..	9	63,695	
Metered supplies																				
Agra	12	..	3	40	100	..	53	39	..	25	2	5	..	5	2	..	1	..	287	
Allahabad	..	..	..	1	137	28	101	55	..	18	21	9	13	2	1	..	..	..	381	
Benares	..	..	..	..	202	14	25	80	13	9	5	4	1	..	..	..	..	..	303	
Cawnpore	..	..	..	..	1,261	..	263	385	9	153	56	36	10	..	..	..	..	1	2,174	
Lucknow	..	..	..	..	246	..	114	120	..	42	15	6	5	..	1	1	..	..	550	
Meerut	..	..	..	..	37	..	3	4	..	..	..	2	..	..	..	..	..	..	46	
Mussoorie	..	..	..	..	676	..	51	6	..	..	..	2	..	..	..	..	..	..	735	
Naini Tal	..	..	..	..	133	242	18	3	..	1	..	..	..	..	..	..	..	..	402	
Dehra Dun	..	..	..	..	32	..	5	15	..	1	..	..	..	..	..	..	..	..	53	
Jhansi	..	..	..	..	..	..	1	6	..	2	4	..	..	..	..	..	..	..	13	
Mirzapur	..	..	..	..	4	..	4	..	..	..	..	1	..	..	..	..	..	..	9	
Muttra	33	..	27	..	5	..	3	..	..	..	..	..	..	..	..	..	..	..	68	
Fyzabad	..	..	..	..	23	..	12	11	..	..	..	..	..	..	..	..	..	..	46	
Hardwar	..	..	6	1	14	..	1	2	..	..	..	..	..	..	..	..	..	..	24	
Unao	..	..	..	25	5	..	1	..	..	..	..	..	..	..	..	..	..	..	31	
Kosi	..	..	1	15	12	..	1	1	..	..	1	..	..	..	..	..	..	..	31	
Fatehpur-Sikri	..	..	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	
Aligarh	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
Almora	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
Total ..	45	..	37	84	2,892	279	656	677	22	251	104	65	29	7	4	1	1	1	5,155	

APPEN

Annual maintenance accounts of

Particulars	Agra	Allahabad	Benares	Cawnpore	Lucknow	Meerut	Mussoorie
I—Establishment—	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
(a) Engineers ..	10,132	6,912	14,912		7,482	3,600	
(b) Mechanics and drivers	19,378	21,037	12,602		15,267	10,164	
(c) Workshop ..	4,656	5,283	7,113	58,323	5,598	Nil	15,531
(d) Clerical staff ..	1,289	4,307	5,117		3,999	1,068	
(e) Menial staff ..	3,266	8,741	12,584		15,248	972	
(f) Office contingencies	1,398	631	554	160	2,114	958	2,847
(g) Rent	437	810	547	675	778	60	Nil
II—Supplies—							
(a) Fuel	(1) 65,467	(2) (a)1,267	(3) 1,40,272		Nil	(6) Nil	Nil
(b) Power supply ..	(1) 20,029	(2) 1,54,296		(4) 1,18,959	(5) 1,90,347	Nil	Nil
(c) Lubricants ..	4,428	2,561	611	290	611	83	2,303
(d) Waste	275	327	276	185	290	199	
(e) Packing	250	193	98	Nil	390	472	5,327
(f) Stores	5,331	2,129	1,309	3,060	3,295	1,095	
III—Repairs and maintenance—							
(a) River training ..	2,657	Nil	Nil	Nil	Nil	Nil	Nil
(b) Channels and wells..	4,305	Nil	Nil	Nil	790	3	Nil
(c) Settling tanks ..	994	8,739	2,735	4,251	1,722	65	Nil
(d) Filter beds ..	4,127	2,870	3,708	180	2,801	891	Nil
(e) Purchase of sand ..	1,781	6,799	2,999	Nil	15,665	1,200	Nil
(f) Alumina ferric compound.	1,759	6,142	4,756	9,581	18,846	2,029	Nil
(g) Chlorinating chemicals.	3,830	1,664	included in item IV(a)	Nil	4,239	Nil	Nil
(h) Distribution system and fittings.	978	656	395	7,651	2,290	322	8,160
(i) Standposts and hydrants.	240	383		Nil	397	Nil	952
(j) Meters	Nil	22	154	13,954	210	Nil	Nil
(k) Buildings ..	661	1,167	2,999	1,081	2,501	300	1,205
(l) Machinery ..	5,715	4,311	849	1,974	5,064	1,199	901
(m) Tools and plant ..	240	562	Nil	5,084	94	Nil	Nil
IV—Other charges—							
(a) Water analysis ..	Nil	1,084	1,959	1,251	2,564	1,078	1,130
(b) Canal Department dues.	1,000	Nil	Nil	75,000	Nil	4,710	Nil
(c) Miscellaneous ..	Nil	Nil	Nil	Nil	Nil	Nil	290
Total maintenance ..	1,64,657	2,43,393	2,16,549	3,01,609	3,03,442	30,458	38,046
V—Repayment of loan charges (with interest).	65,329	1,45,212	88,090	34,522	1,57,323	Nil	41,125
VI—Credit to municipal electric supply for power.	Nil	Nil	Nil	Nil	55,990*	Nil	61,339
TOTAL CHARGES ..	2,29,986	3,88,605	3,04,639	3,36,131	5,16,755	30,458	1,80,510

*Rs.55,990 credited to municipal account for services rendered by other departments of the board.

(1) Rs 15,050 in excess of consumption. Electrical charges includes Rs.1,305 for Maithan and Chili Int.

(2) Rs 2,028 less on consumption.

(a) Cost of coal for municipal purposes and fuel oil for Daraganj tube well.

(3) Rs.4,445 less on consumption. Coal worth Rs.3,726 was used for workshop and municipal purposes.

(4) Rs. 377 in excess of consumption. Coal worth Rs.1,171 was used for workshop and municipal purposes.

(5) Rs.3,940 less on consumption. No coal purchased during the year. Last year's stock worth Rs.4,230 was used for workshop and municipal purposes.

(6) Pumping done by turbine. No fuel was purchased during the year. Last year's stock was used for banking engines and workshop, etc.

water-works in the United Provinces, during the year 1933-34.

Naini Tal	Dehra Dun	Jhansi	Mirzapur	Muttra	Fyzabad	Hardwar	Unao	Kosi	Fatehpur Sikri	Aligarh	Almora
Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs	Rs.	Rs.	Rs.	Rs	Rs.
	Nil	Nil	Nil	2,661	4,008	3,527	981	Nil	1,197	1,360	Nil
	Nil	1,536	2,542	3,505	5,893	2,541	878	1,741	173	1,928	Nil
7,759	Nil	Nil	Nil	841	2,081	834	Nil	Nil	Nil	Nil	Nil
	4,025	Nil	295	5,328	760	647	Nil	540	Nil	266	Nil
	3,474	1,262	263	307	1,402	694	728	117	233	741	1,244
71	154	367	102	53	407	26	22	172	85	346	Nil
Nil	Nil	Nil	Nil	350	Nil	Nil	28	Nil	17	Nil	Nil
(7) 39	Nil	(8) 8,393	Nil	(9) 4,054	(10) 8,374	Nil	(11) 3,955	(13) 1,688	(15) 1,039	Nil	Nil
Nil	Nil	Nil	Nil	(9) 22,982	Nil	Nil	Nil	Nil	Nil	(14) 19,000	Nil
119	Nil	191	Nil	982	2,292	54	1,897	818	261	155	Nil
26	Nil	20	Nil	15	56	Nil	111	26	24	8	Nil
45	Nil	182	Nil	Nil	Nil	80	Nil	Nil	15	1,044	Nil
1,653	Nil	149	Nil	79	258	Nil	505	63	70		
Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	220	Nil
Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Nil	Nil	Nil	255	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	224	Nil
1,256	985	367	158	433	549	87	Nil	258	20	271	3
Nil	Nil	20	233	341	Nil	149	Nil	Nil	32	Nil	Nil
42	Nil	433	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
287	Nil	358	Nil	158	212	167	19	89	Nil	80	Nil
4,064	Nil	173	Nil	1,809	2,704	117	Nil	880	225	59	Nil
618	Nil	Nil	Nil	157	75	121	698	182	13	Nil	1,190
1,091	10	240	238	Nil	284	Nil	632	97	128	374	Nil
Nil	Nil	7,398	Nil	Nil	Nil	Nil	Nil	Nil	Nil	300	Nil
Nil	Nil	88	Nil	174	Nil	373	Nil	Nil	Nil	60	582
17,070	3,648	21,177	4,086	44,189	29,454	9,397	10,449	6,616	3,560	25,956	3,019
25,589	13,872	Nil	10,602	18,350	11,426	11,424	1,408	Nil	Nil	38,282	6,678
28,808	Nil	Nil	Nil	Nil	Nil	20,725	Nil	Nil	Nil	Nil	Nil
71,467	21,520	21,177	14,688	62,539	40,880	41,546	11,857	6,616	3,560	65,238	9,697

(7) Cost of coal for municipal purposes.
(8) Rs.421 in excess of consumption
(9) Rs.1,976 less on consumption. Fuel oil was used for pumping water by Diesel engines and municipal purposes.
(10) Rs.84 in excess of consumption.
(11) Rs.163 less on consumption.
(12) Rs.214 in excess of consumption.
(13) Rs.252 ditto.
(14) Rs.70 less on consumption.

APPENDIX E

Statement showing cost of subsequent extensions and improvements, chargeable to capital on the various water-works in the United Provinces for the year ending 31st March, 1934

Water-works stations	Initial capital cost	Cost of subsequent extension	Expenditure during the year 1933-34	Total
	Rs.	Rs.	Rs.	Rs.
1. Agra	11,70,761	24,23,338	16,876	36,10,975
2. Allahabad..	16,24,061	29,13,971	24,345	45,62,377
3. Benares	25,61,831	18,77,266	15,419	44,54,566
4. Cawnpore..	14,44,570	22,25,486	7,827	36,37,883
5. Lucknow	15,15,736	49,90,337	98,708	66,04,781
6. Meerut	7,51,710	72,392	13,490	8,37,592
7. Mussoorie	4,79,754	8,14,745	1,728	12,96,227
8. Naini Tal	2,47,000	8,10,292	1,949	10,59,241
9. Dehra Dun	97,241	3,87,241	33,455	5,17,937
10. Jhansi	96,556	1,14,293	12,466	2,23,315
11. Mirzapur..	5,98,492	1,44,505	994	7,43,991
12. Muttra	5,17,283	1,38,501	13,406	6,69,195
13. Fyzabad	9,48,662	91,076	2,331	10,42,069
14. Hardwar	1,96,919	3,00,319	17,747	5,14,985
15. Unao	1,18,664	72,976	2,168	1,93,808
16. Kosi	70,822	2,008	4,703	77,098
17. Fatehpur-Sikri	52,034	15,431	443	67,908
18. Aligarh	5,70,992	22,669	698	5,94,359
19. Almora	1,73,657	1,115	137	1,74,909
Grand total ..	1,32,36,300	1,74,27,961	2,68,895	3,09,33,156

APPENDIX F

Statement showing filter area out of operation, rate of filtration, and results of water analyses of the water-works in the United Provinces during the year 1933-34.

Water-works	Sand filter area out of operation per million gallons pumped square feet.	Filtration rate in gallons per square foot per day of sand filter			Water from supply mains						
					Chemical analyses			Bacteriological analyses			
		Maximum	Minimum	Average	Good	Bad	Total	Number of samples tested	Number of samples containing over 100 colonies	Average number of microbes per c. c.	Percentage (on total) of samples over 100 per c. c.
Agra	5,262	34·00 1937*	24·00 1325*	30·92 1811*	3	1	4	577	98	4·80	16·99
Allahabad ..	8,267	50·00 1791*	10·00 1070*	33·54 1474*	5	..	5	471	13	38·20	2·70
Benares ..	5,257	50·00	25·00	40·59	4	..	4	589	161	143·10	27·30
Cawnpore ..	301	66·00	18·00	44·39	4	..	4	750	..	25·90	..
Lucknow ..	2,295	62·50 2500*	6·20 301*	39·25 1665*	17	3	20	225	2	28·20	0·88
Meerut ..	4,285	31·00	25·00	30·28	4	..	4	234	22	33·30	9·40
Mussoorie ..	Water supply from deep springs and is not filtered.				5	2	7	115	19	43·60	16·50
Naini Tal ..					4	1	5	104	8	59·10	7·60
Dehra Dun ..					11§	1	12	148	59	61·60	39·80
Jhansi ..	Unfiltered supply				2	1	3	10	8	251·20	80·00
Mirzapur ..	Gravitation supply				..	1	1	70	9	51·10	12·80
Muttra ..	Tube-well supply				3	1	4	111	8	11·90	7·20
Fyzabad ..					..	3	3	125	..	16·20	..
Hardwar ..					12	4	16	300	56	41·00	18·60
Unao					2	..	2	55	1	17·00	1·80
Kosi					1	..	1	24	2	13·70	8·30
Fatehpur Sikri ..					..	1	1	12	10	95·20	83·30
Aligarh ..					6‖	..	6	97	2	28·60	2·00
Almora ..	Gravitation supply				..	..	..	..	..	..	..

* For Paterson Filters. § Excepting for hardness which in some cases is very high.
‖ Except for high chlorine and Nitrites and Nitrates.

APPENDIX G

Details of pumps, filters, tanks, reservoirs, rising mains, and other details of the water-works in the United Provinces for 1933-34.

Particulars	Agra	Allahabad	Bareilly	Cawnpore	Lucknow	Meerut	Saharanpur	Nainital	Dehra Dun	Jhansi	Mirzapur	Mathura	Fyzabad	Hardwar	Unao	Kosi	Bulandshahr-Sikri	Aligarh	Almora
1 Pump levels:																			
Unfiltered Station R. L.	365·20'	290·00'	554·00'	402·00'	387·50'	739·52'	Murray Spring 5,021'	"	"	719·25'	"	530·00'	Old station 322·57' New station 329·51'	941·50'	411·24'	612·40'	557·00'	"	5,351·52'
Filtered Station R. L.	365·20'	291·25'	293·00'	410·00'	395·25'	739·50'	Bhilwan Spring 5,037'	"	"	"	"	"	"	"	"	"	"	"	"
2 Highest water level during the year, R. L.	405·60'	276·67'	297·05'	372·00'	389·07'	"	Mashinon Spring 6,000' Lambone Spring 6,863'	"	"	757·25'	"	"	"	"	"	637·57'	543·02'	"	"
3 Lowest water level during the year, R. L.	441·30'	297·50'	293·38'	357·70'	312·50'	"	"	"	"	760·27'	"	"	"	"	"	650·57'	537·02'	"	"
4 Particulars of plant:																			
Unfiltered Station	2 Diesel sets .. 1 L. D. Worthington. 2 Mather and Platt motor driven vertical spindle centrifugal pump.	3 Mather and Platt "Lonowane" centrifugal pumps direct driven by A. C. motors.	1 H. D. Worthington (Standby). 2 Geared sets (Standby). 2 Worthington vertical spindle centrifugal pumps direct driven by G. E. C., A. C. motors.	1 Triple expansion rotary. (Standby). 2 Vertical spindle centrifugal pumps direct driven by A. C. motors at river side. 3 sets of centrifugal pumps direct driven by electric motor at unfiltered station Benajhabar.	2 Mather and Platt motor driven "Medivans" centrifugal pumps. 1 Harland centrifugal vertical pump driven by A. C. motor.	2 Water power turbines. 1 Semi-portable engine.	Murray Spring: Two sets electrically driven geared three mot pulleys single reduction gearing. Bhilwan Spring: Two sets as above. Mashinon Spring: Two pumps as above but with double reduction gearing. One semi-Diesel oil engine. Lambone: Two sets of Worthington-Simpson three throw single plunger power pumps driven by Messrs Hindustan-Vickers reduction mounts.	Lake Station: 2 motor driven Worthington centrifugal pump. Main Station: Four Mather and Platt motor driven pumps. Two single cam geared pumps. One spring pump driven by A. C. motor.	Gravitation supply.	2 Worthington compound steam engine and pump.	Gravitation supply.	2 Two cylinder Marshall Diesel engines, D. C. generator motor driven Mather and Platt centrifugal pumps. One air converted to A. C. motor taking energy from the Electric Supply Company. One A. C. motor driving Sullivan air compressor for air lift pump and one Worthington centrifugal pump.	2 Two cylinder Marshall engines and motor-driven Mather and Platt centrifugal pump. One single stage double acting Sullivan air compressor under belt driven. One horizontal direct driven electric motor centrifugal pump.	3 Mather and Platt centrifugal pumps driven by A. C. motors.	Two 30 B. H. P. Tangye crude oil engine. 2 Sullivan air compressor. 3 air lift pumps in tube-wells and two 6" Worthington centrifugal pump.	One 16 B. H. P. Tangye crude oil engine. One single stage double acting belt driven Sullivan air compressor. One standard Sullivan air lift pump in tube-well. One belt driven Worthington Simpson two stage centrifugal pump.	One 16 B. H. P. Tangye crude oil engine. One Sullivan air lift pump in tube well. One single stage double acting Sullivan horizontal air compressor. One Duplex reciprocating pump.	Hyderabad Zone: Two Harland Engineering horizontal centrifugal pumps direct driven by A. C. motors. Low Zone: Four Harland Engineering Borehole vertical pumps direct driven by A. C. motors.	Gravitation supply.
Filtered Station..	3 Dulis and Morgan. 1 H. D. Worthington. 2 Beams. 2 motor driven Worthington Simpson centrifugal pumps at Mathura and Chuli Ink.	3 Mather and Platt "Lonowane" centrifugal pumps direct driven by A. C. motors. 2 beams (Standby).	2 pairs of compound beams (Standby). 4 horizontal centrifugal pumps direct driven by G. E. C., A. C. motors.	2 L. D. Worthington. (Standby). 1 H. D. Worthington. (Standby). 4 sets of centrifugal pumps direct driven by A. C. motors.	3 Mather and Platt "Medivans" centrifugal pumps driven by A. C. motors.	2 Water power turbines.	"	"	"	"	"	"	"	"	"	"	"	"	"
5 Capacity of pumps: Unfiltered station G. P. M.	Diesel sets 3,000 each. H. D. Worthington 1,700. Mather and Platt centrifugal pump 3,300 each.	Motor pumps 3,000 each.	H. D. Worthington 2,800. Geared 4,200 each. Motor pumps 6,000 each.	Triple expansion 3,675. Motor pumps River side 3,300 each. Benajhabar 3,300 each.	Motor pumps 7,560 each. Harland pump 10,000.	1,200 each	"	Murray Spring 180 Bhilwan Spring 190 Mashinon Spring 90 Lambone Spring 56 Lake side pump 200 each. Main— H. S. 125 each. L. S. 185 each. L. Z. 390 each. Spring 60	"	375 each	"	1,000 each 300	" 200 each 300 each	150 each	"	300 each	150	"	150 H. D. 300 each. L. D. 150	"
Filtered station G. P. M.	Dulis 3,000 each. H. D. Worthington 5,400. Beams 3,000 each. Worthington 300 each.	Electric pumps 3,250 each. Beams 3,100 each	Beams 3,200 each 4 motor driven centrifugal pumps R—3,000 each. L—3,000.	H. D. Worthington 4,719. L. D. Worthington 3,195 each. Motor pumps 3,000 each.	Motor pumps 6,000 each.	1,100 each	"	"	"	"	"	"	"	"	"	"	"	"	"

APPENDIX G—(*continued*)

Details of pumps, filters, tanks, reservoirs, rising mains, and other details of the water-works in the United Provinces for 1933-34.

Item nos.	Particulars	Agra	Allahabad	Benares	Cawnpore	Lucknow	Meerut	Mussoorie	Naini Tal	Dehra Dun	Jhansi	Mirzapur	Muttra	Fyzabad	Hardwar	Unao	Mosi	Bhalgpur-Sirri	Aligarh	Almora
6	Number of: (a) Rising mains (b) Leading mains (c) Distribution mains.	Three .. Twelve .. Not supplied ..	Two .. Fourteen .. Eleven ..	Two .. Three .. One ..	Two .. Six .. Twelve ..	Two .. One .. Eighteen ..	Two .. Not supplied .. Ten ..	Four .. Seven .. Five ..	Six .. Six .. Three ..	Not supplied .. Six .. Ten ..	One .. One .. Nineteen ..	One .. Eight .. Five ..	One .. Three .. Fourteen ..	One .. One .. Eleven ..	One .. One .. Three ..	Two .. Nil .. Three ..	One .. One .. Five ..	One .. One .. Four ..	Three .. Two .. Eight ..	One (in different sections). Three. Five.
7	Length and size of:— (a) Rising mains	1. 10,407 ft. 26" 2. 7,930 „ 18" 3. 10,410 „ 6"	1. 9,580 ft. 20" 2. 9,360 „ 20"	1. 4,008 ft. 24" (cold). 2. 4,065 ft. 32" (sewp).	1. 9,000 ft. 20" 2. 9,000 „ 20"	1. 15,840 ft. 20" 2. 17,580 „ 20"	1. 13,930 ft. 18" 2. 8,550 „ 18"	1. 5,730 ft. 6" 2. 3,157 „ 8" 3. 1,450 „ 8½" 4. 3,100 „ 3"	1. 1,330 ft. 6" 2. 2,517 „ 6" 3. 1,595 „ 6" 4. 4,010 „ 1" 5. 3,454 „ 4" 6. 3,474 „ 3½"	Not supplied ..	1. 10,972 ft. 9"	1. 20,254 ft. 18"	1. 4,817 ft. 12"	1. 7,047 ft. 14"	One connected with: *900 ft. 15" 591 „ 12" 565 „ 10" 577 „ 8"	1. 1,650 ft. 6" 2. 500 „ 8"	1. 2,500 ft. 6"	1. 3,850 ft. 6"	1. 3,050 ft. 15" 2. 165 „ 8" 3. 1,000 „ 7"	1. 892 ft. 3" 2. 2,982 „ 2½" 3. 2,043 „ 3" 4. 5,704 „ 2½" 5. 913 „ 1"
	(b) Leading mains	1. 4,000 ft. 18" 2. 2,550 „ 18" 3. 2,900 „ 18" 4. 975 „ 18" 5. 3,650 „ 18" 6. 700 „ 18" 7. 1,800 „ 18" 8. 2,800 „ 18" 9. 800 „ 16" 10. 2,650 „ 16" 11. 1,510 „ 6" 12. 1,750 „ 6" 13. 1,400 „ 7"	1. 980 ft. 30" 2. 2,541 „ 20" 3. 3,310 „ 20" 4. 13,268 „ 20" 5. 4,213 „ 18" 6. 5,965 „ 18" 7. 1,850 „ 18" 8. 1,950 „ 20" 9. 2,020 „ 9" 10. 4,488 „ 8" 11. 6,065 „ 7" 12. 3,483 „ 6" 13. 3,410 „ 5" 14. 4,018 „ 4"	1. 10,890 ft. 30" to 8". 2. 21,045 ft. 30" to 6". 3. 2,217 ft. 15"	1 7,900 ft. 18" 2 1,375 „ 10" 3 850 „ 18" 4 4,450 „ 20" 5 1,850 „ 18" 6 5,800 „ 16"	1. 1,890 ft. 30"	Not supplied ..	1. 7,600 ft. 4½" 2. 3,157 „ 4" 3. 5,950 „ 3½" 4. 9,800 „ 3" 5. 2,700 „ 2½" 6. 7,145 „ 2" 7. 2,000 „ 1½"	1. 5,380 ft. 6" 2. 3,230 „ 6" 3. 30,921 „ 2½" 4. 12,070 „ 2" 5. 15,884 „ 1½" 6. 5,050 „ 1½"	1. 7,370 ft. 6" 2. 17,465 „ 5" 3. 2,560 „ 4" 4. 62,500 „ 3" 5. 23,715 „ 2½" 6. 10,945 „ 2"	1. 2,520 ft. 20"	1. 8,095 ft. 20" 2. 2,650 „ 15" 3. 1,065 „ 12" 4. 1,361 „ 10" 5. 9,016 „ 8" 6. 8,702 „ 8" 7. 1,960 „ 6" 8. 1,021 „ 4"	1. 21 ft. 18" 2. 1,155 „ 14" 3. 600 „ 12"	1. 50 ft. 12"	One connected with: *900 ft. 15" 5,833 „ 12" 6,952 „ 10" 2,945 „ 8" 4,861 „ 6" †2,800 „ 6" 1,145 „ 4" 210 „ 3"	Nil ..	1. 152 ft. 7"	1. 3,301 ft. 3"	1. 6,915 ft. 20" to 0" 2. 3,687 „ 18" to 7"	1. 20,667 ft. 4" 2. 47,757 „ 3" 3. 15,840 „ 6"
	(c) Distribution mains.	Not supplied ..	1. 930,158 ft. 18" to 3".	1. 600 ft. 18" 2. 635 „ 14" 3. 5,300 „ 12" 4. 9,100 „ 11" 5. 8,680 „ 10" 6. 8,976 „ 8" 7. 24,063 „ 8" 8. 10,219 „ 7" 9. 17,300 „ 6" 10. 45,576 „ 5" 11. 45,600 „ 4" 12. 38,645 „ 3" *Note*—Rider mains are included in the distribution mains.	1. 1,200 ft. 24" 2. 5,101 „ 20" 3. 8,937 „ 18" 4. 8,811 „ 15" 5. 4,076 „ 15" 6. 2,977 „ 13" 7. 7,095 „ 12" 8. 2,903 „ 11" 9. 4,130 „ 10" 10. 17,687 „ 9" 11. 13,978 „ 8" 12. 16,604 „ 7" 13. 15,095 „ 6" 14. 31,808 „ 5" 15. 63,385 „ 4" 16. 152,110 „ 3" 17. 2,366 „ 2" 18. 100 „ 1½"	1. 594 ft. 7" 2. 613 „ 10" 3. 3,931 „ 7" 4. 8,831 „ 6" 5. 2,555 „ 5" 6. 11,970 „ 4" 7. 31,960 „ 3" 8. 3,747 „ 2" 9. 720 „ 1" 10. 541 „ 4"	1. 2,550 ft. 24" 2. 14,365 „ 9" 3. 4,480 „ 1½" 4. 10,075 „ 1" 5. 3,000 „ 3"	1. 1,102 ft. 24" 2. 22,125 „ 1" 3. 95,704 „ 1"	1. 4,600 ft. 5" 2. 10,958 „ 4" 3. 13,850 „ 3" 4. 10,740 „ 2½" 5. 10,211 „ 2" 6. 4,400 „ 1½" 7. 7,910 „ 1½" 8. 13,700 „ 1" 9. 9,720 „ 2" 10. 930 „ 2"	1. 2,970 ft. 9" 2. 1,980 „ 6" 3. 9,076 „ 6" 4. 1,556 „ 6" 5. 3,820 „ 4" 6. 6,930 „ 4" 7. 5,704 „ 4" 8. 1,285 „ 4" 9. 1,055 „ 4" 10. 720 „ 3" 11. 640 „ 3" 12. 980 „ 3" 13. 970 „ 3" 14. 16 „ 2" 15. 10 „ 2" 16. 16 „ 2" 17. 16 „ 2" 18. 16 „ 2" 19. 16 „ 2"	1. 540 ft. 7" 2. 1,260 „ 6" 3. 2,007 „ 5" 4. 6,016 „ 4" 5. 31,000 „ 3"	1. 693 ft. 18" 2. 1,155 „ 9" 3. 660 „ 8" 4. 9,640 „ 7" 5. 3,630 „ 6" 6. 7,915 „ 5" 7. 14,025 „ 4" 8. 49,564 „ 3" 9. 600 „ 2½" 10. 8,899 „ 2" 11. 130 „ 1½" 12. 14,070 „ 1" 13. 3,798 „ 2" 14. 9,363 „ 1"	1. 434 ft. 18" 2. 198 „ 14" 3. 60 „ 12" 4. 1,175 „ 10" 5. 3,056 „ 8" 6. 1,650 „ 8" 7. 7,125 „ 7" 8. 7,950 „ 6" 9. 7,150 „ 5" 10. 10,210 „ 4" 11. 20,950 „ 3"	1. 10,500 ft. 6" 2. 7,644 „ 4" 3. 1,042 „ 3" *Note.—This is one length of 15" pipe and common for rising and leading. †This is common to leading and distribution.	1. 291 ft. 6" 2. 1,268 „ 4" 3. 22,014 „ 3"	1. 1,100 ft. 6" 2. 1,500 „ 4" 3. 7,998 „ 3" 4. 3,761 „ 2½" 5. 560 „ 2"	1. 421 ft. 12" 2. 464 „ 11" 3. 283 „ 1" 4. 1,116 „ 4"	1. 78 ft. 6" 2. 593 „ 5" 3. 6,064 „ 4" 4. 9,910 „ 6" 5. 22,906 „ 3" 6. 25,714 „ 4" 7. 13,719 „ 3" 8. 6,917 „ 2½"	1. 4,041 ft. 3" 2. 593 „ 5" 3. 1,056 „ 3" 4. 125 „ 2½" 5. 100 „ 1½"
8	Number of settling tanks.	Five ..	Three ..	Three ..	Five ..	Three ..	Three ..	..	..	..	..	..	..	..	..	..	..	..	..	One.
9	Size of settling tanks	250' X 151' X 10' each.	Two 265' X 207' Bottom 252' X 197'. Height 10·75'. each.	No. 1 and 2—400'7" X 265'0" X 18' each. No. 3—400'0" X 252'0" X 18'.	Three—283'6" X 229'9" X 15' each. Two—306'0" X 134' X 5' each. Three—7,840,000 each. Two—15,000,000 each.	240' X 200' X 10·5' each.	100' X 100'6" X 11' each.	..	..	..	..	..	..	..	..	..	..	..	..	200' X 14' X 16'
10	Capacity of settling tanks, gallons.	3,500,000 each ..	No. 1 and 2—4,400,000 each. No. 3—4,456,000.	No. 1 and 2—3,041,766 each. No. 3—2,712,145.	7,000,000 each ..	500,000 each ..	..	..	..	..	..	..	..	..	..	..	..	..	..	10,000.
11	Number of:— (a) Slow sand filters	Seven ..	Six ..	Ten ..	Nine Twelve Pressure Chamber.	Seven ..	Four ..	..	One chlorine plant	..	..	..	..	..	..	..	..	..	..	..
	(b) Pressure filters	Two ..	Five ..	..	..	Ten ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	(c) Mechanical filters.	Two ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
12	Size of:— (a) Slow sand filters	200' X 100' each	200' X 100' each	200' X 100' each	200' X 100' each. Press. Chamber 150' X 20' each.	200' X 100' X 7' each.	150' X 100' each.	..	..	..	..	..	..	..	..	..	..	..	..	..
	(b) Pressure filters	32' X 16' X 12' (bell-jar known as).	32' X 16' X 12' each.	..	..	32' X 16' X 12' each.	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	(c) Mechanical filters.	12 ft. X 12 ft. each.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..

APPENDIX G—(*concluded*)

Details of pumps, filters, tanks, reservoirs, rising mains, and other details of the water-works in the United Provinces for 1923-24.

Item No.	Particulars	Agra	Allahabad	Bareilly	Cawnpore	Lucknow	Meerut	Moradabad	Naini Tal	Debra Dun	Jhansi	Mirzapur	Mathura	Pyaglad	Hardwar	Unao	Koel	Fatehpur-Sikri	Aligarh	Almora
13	Number of clear water reservoirs.	Three ..	Two ..	Two ..	Three ..	Two ..	One ..	Six	One	..	..	..	..	..	..	..	..	..	..	Six.
14	Size of clear water reservoirs.	105' × 105' × 10' each.	116·8' × 164·8' × 10' each.	178' × 148½' × 10' each.	Two old—157' × 105½' × 14½' each. One new—195' × 207' × 12½'.	107' × 105' × 12' each.	24½' × 45' × 7'	1. 48' × 25' × 8' Mosque Spring. 2. 50' × 30' × 8' Mustham Spring. 3. 48' × 25' × 8' Hallam Spring. 4. 2—14' dia. × 12' each. Landour.	55' × 40' × 6' ..	..	..	..	..	..	..	..	..	..	..	..	1—80' dia. × 11' deep. 2—24' × 24' × 24'
15	Capacity of clear water reservoirs, Gallons.	676,000 each ..	1,163,000 each ..	1,654,048 each ..	Two old—1,125,000 each. One new—2,406,375.	795,360 each ..	110,025 ..	1. 82,016 .. 2. 50,000. 3. 40,050. 4. 10,000 each.	57,519	..	..	..	..	..	..	..	..	..	..	1—40,000. 6—5,000 each.
16	Number of service reservoirs.	Four ..	One ..	One ..	Two ..	One	Two ..	Sixteen ..	One hundred ..	66	Eleven ..	One ..	Two	One ..	Two	One ..	One ..	Two ..	One ..	..
17	Size of service reservoirs.	H. Z. (1) 60' dia. × 11½' deep. L. Z. (2) 30' × 16' × 8' each. (1) 60' × 16' × 8'.	50-95' dia. × 21' deep.	60' dia. × 15' deep.	50·5' × 50' at parade. 30·5' × 40' at water works.	67' × 67' × 12' ..	27' × 27' each ..	One 1Mi 1. 48' × 24½' × 12'. 2. 30' × 30' × 8' Vincent Hill. 3. 54½' × 30' × 12' 4. 40' × 30' × 8' 5. 40' × 30' × 8' Sassy Hill. 6. 30' × 24' × 8' Landour Hill. 7. 6—14' dia. × 12' each. Dunlop. 8. 4—14' dia. × 12' each	Small .. 92 Large .. 9 *Small* 21—5' × 3' each 23—3½' × 3' " 11—5' × 6' × 4' " 3—2' × 3' " 3—6' × 3' × 4' " 2—4' × 3' " 3—6' × 4' × 2' " 2—5' × 3' × 3' " 1—[illegible] × 3' 1—3' × 3' – 10' 3—1'—10' × 3' each 1—3½' × 3½' 1—3½' × 4'—10' 1—3'—10' × 3'—1' 1—3½' × 3' × 4½' 1—7' × 3½' × 3' 1—2'—10' × 3' 1—4' × 4½' 1—3½' × 4½' 1—3½' × 3' 1—3½' × 3' 9—4' × 4' × 4' each large. 1—31' 30' × 10' 1—11' 30' × 9½' 1—27' × 18½' 1—20·15' × 9' 1—15·15' × 9' 1—3½' × 10'	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
18	Capacity of service reservoirs, Gallons.	H. Z. 275,000 L. Z. 2—24,000 each. 1—18,000	500,000	385,000	At parade 3,12,206 At water-works 395,105	250,000	100,000 each	(1) 212,375 .. (2) 80,000 (3) 250,000 (4) 50,000 (5) 50,000 (6) 75,000 (7) 6—10,000 each (8) 4—10,000 "	150,000	Total capacity 285,800 ranging from 100 to 30,000.	1—70,000 3—30,000 each 7—270 each	1,810,000	100,000 each	150,000	200,000 each	30,000	10,000	30,000 each	200,000	..
19	Number of public standpipes:																			
	One tap:																			
	(a) Cast iron spout	243	101	..	..	..	6	38	..	..	..	..	..	45	..	50	..	..	38	..
	(b) W. N. Cocks	135	247	188	..	447	179	30	..	5	..	186	307	34	11	6	..	14	7	..
	(c) Ellwoods	2	157	1	101	..	..	37	121	39	4	44	6	..	..	50	5	..	..	39
	(d) Push cocks	21	122	..	..	..	..	30	..	1	1	..	..	..	3	..	3	..	..	3
	(e) Other type	10	15	..	..	..	..	..	..	1	..	..	3	..	..	..	..	..	..	..
	Two taps:																			
	(a) Cast iron spout	72	44	..	..	..	..	12	..	..	..	..	..	45	..	..	..	..	17	..
	(b) W. N. Cocks	..	..	68	..	120	..	..	..	..	..	..	45	..	..	..	..	10	..	..
	(c) Ellwoods	..	..	..	81	..	..	..	..	40	..	..	..	..	..	..	..	..	..	36
	(d) Push cocks	..	..	..	..	..	..	..	..	1	6	..	..	..	..	..	12	..	..	..
	(e) Other type	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	Three taps:																			
	(a) Cast iron spout	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	(b) W. N. Cocks	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	(c) Ellwoods	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	(d) Push cocks	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	(e) Other type	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	Four taps:																			
	(a) Cast iron spout	22	12	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	(b) W. N. Cocks	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	(c) Ellwoods	..	..	..	40	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	(d) Push cocks	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	(e) Other type	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	Total standpipes	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	Total ..	545	712	345	173	621	179	51	121	[illegible]	15	231	361	124	104	45	37	26	105	81
20	Number of fire hydrants.	154	30	27	157	450	..	30	..	[illegible]	..	110	..	6	..	30	17	14	12	..
21	Number of public taps for washing purposes.	..	..	12	..	24	..	..	..	9	..	8	8	17	3	..	..	..	..	..
22	Number of public tanks.	17	46	16	..	..	..	11	3	1	1	40	4	8	..	..	4	..	..	9

[illegible]

(1) [illegible]
(2) [illegible]
(3) [illegible]
(4) [illegible]
(5) [illegible]
(6) [illegible]
(7) [illegible]
(8) [illegible]

APPENDIX H.

Detailed estimate of expenditure incurred on health works under the supervision of the Superintending Engineer, Public Health Department, during the year 1933-34.

Serial number	Name of places	Water-works original and special repairs	Water-works maintenance	Drainage works	Other works	Total	Remarks
		Rs.	Rs.	Rs.	Rs.	Rs.	
1	Agra	16,876	1,64,657	10,494	18,757(1)	2,10,784	(1) Includes Rs.10,065 for repairs to paved roads.
2	Aligarh	698	26,956	1,686	1,793	31,133	
3	Allahabad	24,345	2,43,393	3,539	2,582(2)	2,73,859	(2) Includes Rs.2,371 for pavements of lanes.
4	Allahabad (Magh Mela)	..	12,870	..	10,333(2a)	23,203	(2a) Electric supply.
5	Almora	137	3,019	2,747	1,209	7,112	
6	Amroha	..	..	190	204	394	
7	Atrauli	10	..	79	1,420	1,509	
8	Azamgarh	164	..	281	1,943(3)	2,388	(3) For construction of latrines and urinals.
9	Ballia	438	..	133	928(4)	1,499	(4) Includes Rs.564 for reconstruction of meat-market.
10	Balrampur	59	..	625	100	784	
11	Banda	1,123	..	179	1,933	3,335	
12	Bareilly	1,885	..	13,635	21,646(5)	37,139	(5) Includes Rs.16,223 for pavements.
13	Baraut	17	..	256	66	339	
14	Basti	370	..	350	52	772	
15	Bela (Partabgarh) ..	1,085(6)	..	38	..	1,123	(6) For construction of wells.
16	Benares	15,419	2,16,549	4,064	4,672	2,40,704	
17	Bijnor	124	..	979	4,337(7)	5,440	(7) Includes Rs 2,671 for maintenance of metalled roads.
18	Bisalpur	258	..	190	2,958(8)	3,406	(8) Mainly brick pavements and roads metalling.
19	Brindaban	53	..	669	643	1,365	
20	Budaun	892	..	4,196	209	5,297	
21	Bulandshahr ..	..	..	1,362	..	1,362	
22	Cawnpore	7,827	3,01,609	1,09,196	8,554(9)	4,27,186	(9) Includes Rs.5,835 for construction of Ladies Park and Improvement of other parks.
23	Chandausi	15	..	409	106	530	
24	Chandpur	24	..	584	7,823	8,431	
25	Dehra Dun	33,455(11)	8,643	5,605	482(10)	48,190	(10) Improvement to meat market. (11) Trial boring of a tube-well.
26	Dhampur	..	..	78	..	78	
27	Etah	..	..	1,219	2,274(12)	3,493	(12) Rupees 2,223 for repairs to roads.
28	Etawah	3	..	229	350	582	
29	Fatehpur	201	..	21	..	222	
30	Fatehpur-Sikri ..	443	3,560	104	221	4,328	
31	Fyzabad	2,331	29,454	3,923	51	35,759	
32	Ghaziabad	..	..	4,281	563	4,844	
33	Ghazipur	88	..	621	327	1,036	
	Carried over ..	1,08,313	10,10,715	1,71,962	96,591	13,89,581	

APPENDIX H—(*continued*)

Detailed estimate of expenditure incurred on health works under the supervision of the Superintending Engineer, Public Health Department, during the year 1933-34.

Serial number	Name of places	Water-works original and special repairs	Water-works maintenance	Drainage works	Other works	Total	Remarks
		Rs.	Rs.	Rs.	Rs.	Rs.	
	Brought forward ..	1,08,813	10,10,715	1,71,962	96,591	13,89,581	
34	Gorakhpur	180	..	76,187	6,282	82,649	
35	Gonda	..	..	1,282	375	1,657	
36	Haldwani	..	..	132	539	671	
37	Hardoi	2	..	462	531	995	
38	Hardwar	17,747	30,122	4,935	2,695	55,499	
39	Hathras	..	..	606	..	606	
40	Jalesar	..	..	72	..	72	
41	Jhansi	12,466	21,177	1,608	1,065	36,316	
42	Kairana	..	..	1,604	263	1,867	
43	Kanauj	..	..	665	..	665	
44	Khurja	32	..	783	4,810(13)	5,625	(13) Includes Rs.3,927 for repairs of roads and Rs.856 for repairs of slaughter-house.
45	Kosi Kalan	4,708	6,616	123	..	11,447	
46	Lakhimpur-Kheri ..	..	..	330	587	917	
47	Lalitpur	..	..	235	2,281(14)	2,516	(14) Rupees 566 for construction of a reservoir for road watering.
48	Lucknow	98,708	3,59,432	35,111	31,673	5,24,924	
49	Mau (Jhansi) ..	197	..	221	..	418	
50	Meerut	13,490	30,458	986	..	44,934	
51	Mirzapur	994	4,086	72	1,074	6,226	
52	Moghalsarai ..	..	..	941	7,971(15)	8,912	(15) Includes Rs.1,571 for construction of slaughter-house.
53	Moradabad	..	..	445	2,094(16)	2,539	(16) Rupees 1,324 for extension of slaughter-house and Rs.558 for construction of Ghat.
54	Muttra	13,406	44,189	4,900	5,682(17)	68,177	(17) Includes Rs.4,072 for pavements.
55	Mussooree	1,728	89,385	6,239	13,164	1,10,516	
56	Muzaffarnagar ..	..	..	3,674	893	4,567	
57	Najibabad	524	..	122	2,339(18)	2,985	(18) For roads and pavements.
58	Nagina	300	..	794	50	1,144	
59	Naini Tal	1,949	45,878	511	2,438	50,776	
60	Nawabgauj (Bara Banki)	..	..	857	356	1,213	
61	Orai	4,098	..	366	2,198	6,662	
62	Pahuj (Jhansi) ..	216	..	..	..	216	
63	Pilibhit	..	..	941	1,896(19)	2,837	(19) Rupees 240 for construction of a Park, Rs.184 for constructing a Lethal Chamber and Rs.1,418 for brick pavements.
64	Rae Bareli	..	..	507	83	590	
65	Roorkee	..	..	29	2,598	2,627	
	Carried over ..	2,79,058	16,42,058	3,17,702	1,90,528	24,29,346	

APPENDIX H—(*concluded*)

Detailed estimate of expenditure incurred on health works under the supervision of the Superintending Engineer, Public Health Department, during the year 1933-34.

Serial number	Name of places	Water-works original and special repairs	Water-works maintenance	Drainage works	Other works	Total	Remarks
		Rs.	Rs.	Rs.	Rs.	Rs.	
	Brought forward ..	2,79,058	16,42,058	3,17,702	1,90,528	24,29,346	
66	Shahabad	..	..	332	..	332	
67	Saharanpur	153	..	7,655	5,840(20)	13,648	(20) Rupees 4,171 for pavements and Rs 1,473 for remodelling of mandi.
68	Sahaswan	44	..	175	1,384(21)	1,603	(21) Includes Rs.1,305 for roads.
69	Sambhal	..	..	3,271	..	3,271	
70	Sandila	92	..	82	391	565	
71	Sikandrabad,. ..	..	..	264	..	264	
72	Shahjahanpur ..	124	..	1,115	27,133(22)	28,372	(22) Includes Rs.22,344 for repairs and maintenance of roads.
73	Sikandra Rao ..	72	..	..	356	428	
74	Sitapur	..	..	52	1,013	1,065	
75	Soron	..	..	707	3,419	4,126	
76	Sultanpur	217	..	806	459	1,482	
77	Tanda	..	..	85	..	85	
78	Tilhar	..	250	1,041	1,918	3,209	
79	Ujhani	..	..	818	3,236	4,054	
80	Unao	2,168	10,449	5,000	2,016	19,633	
	Total ..	2,81,928	16,52,757	3,39,105	2,37,693	25,11,483	

APPEN

Comparative statement of fuel consumption, working expenses and receipts

Serial number	Name of water-works	Class of work, gravitation or pumping	Fuel consumed	Fuel consumption per 1,000 foot gallons	Price of fuel per ton	Total (average) lift
1	2	3	4	5	6	7
			Tons.	Lb.	Rs.	Feet.
1	Agra ..	Pumping ..	5,149·12(1)	0·03601	13·68	187·44
2	Allahabad ..	Ditto ..	(2)	..	..	249·41
3	Benares ..	Ditto ..	(3)	..	..	185·19
4	Cawnpore ..	Ditto ..	(4)	..	..	131·69
5	Lucknow ..	Ditto ..	(5)	..	..	195·51
6	Meerut ..	Turbines worked by water power	(6)	..	..	146·59
7	Mussooree ..	Pumping and gravitation.	..	..	..	Av. 1,354·64
8	Naini Tal ..	Ditto ..	(7)	..	..	Av. 390·94
9	Dehra Dun ..	Gravitation ..	..	..	..	Gravitation
10	Jhansi ..	Pumping ..	639·20 (8)	0·09748	12·47	219·08
11	Mirzapur ..	Gravition ..	..	..	..	Gravitation
12	Muttra ..	Pumping ..	(9)	..	..	Av. 158·59
13	Fyzabad ..	Ditto ..	90·95 (10)	0·00814	91·15	Av. 126·97
14	Hardwar ..	Ditto ..	..	..	..	177·14
15	Unao ..	Ditto ..	32·50 (11)	0·00068	126·71	130·00
16	Kosi ..	Ditto ..	10·41 (12)	0·00922	141·59	111·15
17	Fatehpur Sikri	Ditto ..	5·60 (13)	0·00414	140·53	207·62
18	Aligarh ..	Ditto ..	..	..	..	147·10
19	Almora ...	Gravitation ..	..	..	..	Gravitation

(1) Coal 3,790·46 tons, fuel oil 55·76 tons and electrical charges Rs.17,810 (Rs.1,305 for Maithan and Chilli Int and Rs.16,505 for Raw water pumping plant) converted into coal and fuel oil 1,301·90 tons. Coal consumption includes 5·02 tons for Municipal purposes.

(2) Pumping done by electric motors, 44·19 tons of coal used for Municipal purposes and 14·07 tons of fuel oil used for Daraganj tube-well.

(3) Pumping done by electric motors. Coal consumed 310·03 tons (148·55 tons for workshop, etc. and 161·54 tons for Municipal purposes).

(4) Pumping done by electric motors, 94·35 tons of coal used (25·00 tons for workshop, etc. and 69·35 tons for Municipal purposes).

(5) Pumping done by electric motors, 206·09 tons of coal used (14·02 tons for workshop, etc., 7·00 tons for Municipal purposes and 185·07 tons loss at siding).

(6) Pumping done by turbines, 2·00 tons of wood used for other purposes.

DIX I

of various water-works in the United Provinces during the year 1933-34.

Percentage of charges for					Per 1,000 gallons		Per head per annum			Remarks
Establishment	Fuel	Oil and waste	Repairs to machinery.	Other charges	Total working cost	Total receipt	Total working cost	Total receipt	Profit or loss	
8	9	10	11	12	13	14	15	16	17	18
					As.	As.	As.	As	As.	
24·63	51·92	2·86	3·47	17·12	2·15	2·93	16·01	21·83	5·82	Profit.
19·81	63·91	1·19	1·77	13·32	2·80	3·45	33·89	41·76	7·87	"
24·67	64·78	0·41	0·39	9·75	1·77	2·38	23·74	31·94	8·20	"
19·61	39·44	0·14	0·66	40·15	1·69	3·09	22·06	40·35	18·29	"
14·03	52·96	0·26	1·66	31·10	2·56	3·20	37·93	47·41	9·48	"
55·20	..	0·92	3·94	39·94	0·97	1·20	5·34	6·58	1·24	"
20·56	57·43	2·58	0·34	19·09	15·19	10·59	159·93	111·48	48·45	Loss.
17·07	62·88	0·31	3·86	10·88	18·59	22·73	77·31	94·51	17·20	Profit.
38·49	..	..	..	11·51	3·13	2·76	8·52	7·51	1·01	Loss.
14·94	39·63	1·00	0·82	43·61	5·05	5·77	8·42	9·62	1·20	Profit.
78·37	..	..	..	21·63	0·66	1·51	5·50	12·65	7·15	"
29·43	61·18	2·26	4·09	3·04	4·04	5·54	16·33	23·09	6·26	"
49·74	28·43	7·97	9·18	4·38	3·32	3·70	18·69	20·85	2·16	"
27·42	68·80	0·18	0·39	3·21	7·05	8·55	57·63	69·88	12·25	"
25·19	37·85	19·22	..	17·74	3·28	2·31	14·59	12·51	2·08	Loss.
38·85	25·51	12·76	13·30	9·58	4·65	5·60	14·51	17·47	2·96	Profit.
48·03	29·19	8·57	6·40	7·81	3·30	1·36	9·26	3·23	6·03	Loss.
19·33	70·49	0·60	0·22	9·36	10·40	2·52	29·82	7·21	22·61	"
41·21	..	..	..	58·79	4·61	0·23	17·30	0·39	16·91	"

(7) Pumping done by electric motors. 8 maunds of coal used for municipal purposes.

(8) Includes 44·45 tons of coal for municipal purposes and 26·70 shortage.

(9) Pumping done by electric motors, 20·83 tons of fuel oil used for pumping 65·895 million gallons of water by diesel sets.

(10) Includes 0·74 tons for municipal purposes and 0·33 tons shortage.

(11) Includes 1·30 tons of kerosine oil.

(12) " 0·39 Ditto and 0·17 ton shortage.

(13) " 0·49 Ditto.

APPEN

Statement showing initial capital cost, details of income and expenditure

Serial number	Particulars	Agra	Allahabad	Benares	Cawnpore	Lucknow	Meerut	Musscorie	Naini Tal
1	Description of plant ..	Oil Engine, Steam Power and Electric Motors	Steam Power, Oil Engine and Electric Motors	Steam Power and Electric Motors	Steam Power and Electric Motors	Electric Motors	Water turbines and Steam Power	Gravitation and Electric Motors	Gravitation and Electric Motors
2	Initial capital cost in Rupees lakhs.	11·71	16·24	25·62	14·45	15·16	7·52	4·60	2·47
3	Total cost of works in lakhs. ,,	36·11	45·62	44·55	36·88	66·05	8·38	12·96	10·59
4	Number of inhabitants drawing their supply from mains.	229,764	183,914	205,315	243,755	218,000	91,181	13,057	14,791
5	Hours of supply daily ..	9·75	15·00	9·81	16·30	18·50	18·51	24·00	24·00
6	Quantity supplied during year in millions. Gallons	1,708·910	2,222·650	2,756·263	3,187·300	3,227·433	500·612	137·431	61·496
7	Total water horse-power hours per annum in millions.	1·22	1·25	1·33	1·51	1·24	0·33	0·94	0·12
8	Maximum daily average during any one month in millions. Gallons	6·118	7·028	7·895	10·787	9·445	1·463	0·464	0·220
9	Average daily supply for the year in millions. ,,	4·682	6·089	7·551	8·732	8·842	1·372	0·377	0·168
10	Maximum supply per head per day. ,,	26·63	38·21	38·45	44·25	43·33	16·05	35·54	14·87
11	Average supply per head per day. ,,	20·38	33·11	36·78	35·32	40·56	15·04	28·84	11·39
12	Total lift (average) .. Feet	187·41	249·41	185·19	131·69	195·51	146·59	Av. 1,354·64	Av. 390·94
13	Quantity supplied during the year in million foot. Gallons	320,318	554,351	510,432	419,736	620,995	73,385	186,170	24,041
14	Fuel consumed .. Tons	(a)5,149·12	..	..	..	..	..	..	..
15	Fuel consumption per million foot gallons. Lbs.	36·01	..	..	..	..	..	..	..
16	Cost of fuel per ton .. Rupees	13·68	..	..	..	..	..	..	..
17	Cost of establishment per million foot gallons. Annas	2·03	1·39	1·67	2·25	1·28	3·67	1·58	5·21
18	Cost of fuel or electric energy per million foot gallons. ,,	4·27	4·49	4·40	4·53	4·33	..	4·41	19·20
19	Cost of oil and waste per million foot gallons. ,,	0·23	0·03	0·03	0·02	0·02	0·06	0·20	0·10
20	Cost of repairs to machinery per million foot gallons. ,,	0·28	0·12	0·03	0·08	0·15	0·26	0·02	2·70
21	Cost of other charges per million foot gallons. ,,	1·41	0·34	0·66	4·62	2·93	2·65	1·47	3·32
22	Total charges per million foot gallons. ,,	8·22	7·02	6·79	11·50	9·11	6·64	7·68	30·53
23	Maintenance charges per thousand gallons supplied. ,,	1·54	1·75	1·26	1·52	1·78	0·97	10·40	11·98
24	Interest and sinking fund charges per thousand gallons supplied. ,,	0·61	1·05	0·51	0·17	0·78	..	4·79	6·66
25	Total (maintenance and interest and sinking fund per thousand gallons supplied). ,,	2·15	2·80	1·77	1·69	2·56	0·97	15·19	18·59
26	Maintenance charges in thousand. Rupees	164·66	243·39	216·55	301·61	359·43	30·46	89·30	45·88
27	Interest and sinking fund charges in thousand. ,,	65·33	146·21	88·09	34·52	157·32	..	41·12	25·59
28	Total income in thousand. ,,	313·57	480·07	409·88	614·78	646·00	37·53	10·98	87·37
29	Profit or loss on maintenance in thousand. ,,	+148·91	+236·68	+193·32	+313·17	+286·57	+7·07	+1·69	+41·49
30	Profit or loss on maintenance and interest and sinking fund in thousand. ,,	+83·58	+90·47	+105·24	+278·65	+129·25	+7·07	−39·53	+15·90
31	Profit or deficit percentage on total cost of works.	+2·31	+1·98	+2·36	+7·56	+1·95	+0·84	−3·05	+1·50

(a) Coal, fuel oil and electrical energy converted into coal and fuel oil.

DIX J

for water-works in the United Provinces for the year 1933–34.

Dehra Dun	Jhansi	Mirzapur	Muttra	Fyzabad	Hardwar	Unao	Kosi	Fatehpur-Sikri	Aligarh	Almora
Gravitation	Steam Power	Gravitation	Oil Engine and Electric Motors	Oil Engine and Electric Motors	Electric Motors	Oil Engines	Oil Engine	Oil Engine	Electric Motors	Gravitation
0·97	0·97	5·98	5·17	9·49	1·97	1·19	0·70	0·52	5·71	1·74
5·18	2·23	7·44	6·69	10·42	5·15	1·94	0·77	0·68	5·94	1·75
40,409	40,255	42,700	59,441	35,000	11,535	13,000	7,294	6,152	35,030	8,715
24·00	9·49	19·00	7·30	8·37	12·00	10·00	10·00	6·00	4·22	24·00
110·000	67·045	353·203	247·623	197·076	94·247	57·534	22·759	14·533	190·319	39·693
..	0·07	..	0·20	0·13	0·03	0·04	0·01	0·02	0·07	..
0·435	0·230	1·047	0·838	0·616	0·426	0·194	0·081	0·054	0·345	Not available.
0·301	0·184	0·982	0·678	0·540	0·258	0·158	0·062	0·040	0·275	0·692
10·76	5·71	24·52	14·10	17·60	36·93	14·92	11·11	8·73	9·86	..
7·46	4·56	22·98	11·41	15·43	22·38	12·19	8·55	6·49	7·85	10·57
Gravity supply	219·08	Gravity supply.	Av. 158·59	Av. 126·97	177·14	130·00	111·15	207·62	147·10	Gravity supply.
..	14,688	..	39,271	25,023	16,695	7,518	2,530	3,028	14,757	..
..	(b)639·20	..	..	(c)90·95	..	(c)32·50	(c)10·41	(c)5·60	..	..
..	97·48	..	..	8·14	..	9·68	9·22	4·14	..	..
..	12·47	..	..	91·15	..	126·71	141·59	140·53	..	..
..	3·45	..	5·30	9·37	7·92	5·60	16·25	9·04	5·65	..
..	9·14	..	11·01	5·35	19·36	8·42	10·67	5·49	20·60	..
..	0·23	..	0·41	1·50	0·05	4·27	5·34	1·61	0·18	..
..	0·19	..	0·74	1·73	0·11	..	5·57	1·20	0·36	..
..	10·06	..	0·55	0·68	0·93	3·95	4·01	1·47	2·74	..
..	23·07	..	18·01	18·83	28·87	22·24	41·84	18·31	29·22	..
1·26	5·05	0·18	2·85	2·30	5·11	2·39	4·65	3·90	4·33	1·43
1·87	..	0·48	1·19	0·93	1·94	0·39	..	..	6·10	3·13
3·13	5·05	0·66	4·04	3·32	7·05	3·28	4·65	3·90	10·40	4·61
8·65	21·18	4·09	44·19	29·45	30·12	10·45	6·62	3·56	26·96	3·02
12·37	..	10·60	18·35	11·43	11·42	1·41	..	..	38·28	6·68
18·96	24·19	33·77	85·80	45·60	50·98	10·17	7·97	1·24	15·78	0·40
+10·31	+3·01	+29·68	+41·61	+16·15	+20·26	−0·28	+1·35	−2·32	−11·18	−2·58
−2·56	+3·01	+19·08	+23·26	+4·72	+8·33	−1·69	+1·35	−2·32	−49·46	−9·21
−0·49	+1·35	+2·56	+3·48	+0·45	+1·71	−0·87	+1·75	−3·41	−8·32	−5·27

(b) Coal (c) Fuel oil.

APPENDIX K

HYDRO-ELECTRIC SUPPLY.

1933–34.

Particulars	Mussooree	Naini Tal
1. Total units generated	3,595,955* 288,896†	1,102,780
2. Maximum units for any one day	12,439* 10,312†	4,350
3. Average load K. W.	401·47* 178·77†	126·00
4. Power Factor—		
Maximum	0·95	0·94
Minimum	0·75	0·19
5. Load Factor—		
Maximum (monthly)	0·68* 0·08†	0·16
Average		
Minimum (monthly)		
6. Generating Volts—		
Maximum	7,000	3,500
Minimum	6,600	3,500
7. Total hours of running	8,957* 1,616†	8,755
8. Total cubic feet of water used	215,757,300	38,647,755
9. Maximum quantity used in any month, cubic feet	20,247,300	3,647,655
10. Minimum quantity used in any month, cubic feet	15,932,040	2,730,240
11. Average rate of discharge, cubic feet per diem	591,116	105,884
12. Maximum rate of discharge of pipe line—		
No. 1, cubic feet per second	8·30	Both lines worked together.
No. 2, cubic feet per second	8·30	
13. Minimum rate of discharge of pipe line—		
No. 1, cubic feet per second	7·30	
No. 2, cubic feet per second	7·30	
14. Average intake level	4,491	9·90
15. Maximum intake level		12·40
16. Minimum intake level		7·40
17. Total rainfall for the year, inches	100·44	115·70
18. Total cubic feet allowed to pass through the lake sluice overflow intake weir (million cubic feet) (Naini Tal only).	..	221·88
19. Maximum recorded rain fall for 24 hours, inches	3·30	7·10

* Hydro Electric.
† Diesel Sets.

APPENDIX L

Electric Supply.

1933-34.

Particulars	Hardwar
1. Total units received	488,652
2. Maximum units for any one day	4,000
3. Average load K. W.	95
4. Power Factor—	
Maximum	0·85
Minimum	0·80
5. Load Factor—	
Maximum (monthly)	Nil
Average	Nil
Minimum (monthly)	Nil
6. Receiving Volts—	
Maximum	400
Minimum	380

APPENDIX M

Statement showing Electric energy consumed, rate charged and revenue derived.

1933-34.

Particulars	Mussooree			Naini Tal			Hardwar.		
	Units	Rate	Rs.	Units	Rate	Rs.	Units	Rate	Rs.
1. For Municipal purposes :									
Public lighting ..	198,391 *199,828	Two annas .. Do. ..	25,383 *25,133	136,581	Lump sum ..	21,000	64,884	Three annas and seven pies.	14,950
Water supply pumping ..	821,423	One anna	51,339	142,772	Different rates ..	28,808	166,260	Two annas ..	20,725
Other purposes ..	509,910	..	18,591	59,616	Do. ..	3,726	8,717	Three annas and seven pies.	1,974
2. Sold by meter :									
Lighting	281,576 *363,757	Eight annas .. Do. ..	1,08,099 *1,32,892	216,012	Eight annas ..	84,046	(a)60,817 (b)45,463	Six annas .. .. Four annas ..	23,243 11,231
Heating	127,624 *528,858	Two annas .. Do. ..	3,211 *33,979	98,463	One anna and four pies	6,245	..	..	..
Power	..	..	..	9,681	Two annas and eight pies.	1,226	98,759	One anna and six pies	9,539
3. Recoveries on rated premises.	Included in lighting item 2		..	36,500	Rupees two per lamp per mensem.	7,217	18,300	..	3,874
4. Other receipts	..	..	6,851	621	..	2,825	..	..	1,914
5. Meter rent and miscellaneous.	..	..	7,285 *11,189	..	..	6,934	..	..	2,017
6. Total units sold and receipts	†3,031,367	..	4,28,952	‡700,246	..	1,62,027	463,200	..	89,467

* For Dehra Dun.
† Does not include 853,484 units losses in transmission, etc.
‡ Does not include 137,214 units free supply.
(a) Private.
(b) Railways.

APPENDIX N

Statement showing number of electric connexions.

1933-34.

Particulars	Mussoorie		Naini Tal		Hardwar	
	Number	K. W.	Number	K. W	Number	K. W.
1. Private connexions at close of preceeding year.	2,572 3,470*	..	1,739	..	582	..
2. Connexions made during the year ..	177 158*	..	133	..	19	..
3. Metered connexions existing on March 31, 1934.	1,237 1,305*	..	1,002	..	380	..
4. Municipal lamps existing on March 31, 1934.	(a) 911 (b)1,038*	..	474	..	531	..
5. Heating points connected on March 31, 1934.	392 312*	..	269	..	..	..
6. Total K. W. connected on March 31, 1934.	..	4,220	..	1,811·18	..	400
7. Peak load for the year	..	H. E. 940 Diesel 420	..	410	..	156
8. Diversity factor per cent. ..	..	45	..	22·64	..	..

*For Dehra Dun.
(a) Civil area 841, cantonment 70.
(b) Civil area 834, cantonment 204.

APPENDIX O

HYDRO-ELECTRIC SUPPLY.

Annual maintenance account.

1933-34.

Particulars of charges	Mussoorie	Naini Tal
	Rs.	Rs.
I—*Staff Charges*—		
(*a*) Direction	25,300	4,775
(*b*) Office establishment	24,358	11,673
(*c*) Power station staff	23,901	3,991
(*d*) Sub-station staff	5,682	1,344
(*e*) Pipe line staff	..	1,136
(*f*) Overhead line staff	18,174	3,576
(*g*) Auxiliary pump	..	265
(*h*) Contingencies	11,534	3,329
II—*Materials*—		
(*a*) Oils		
(*b*) Lubricants	18,152	1 480
(*c*) Waste		
(*d*) Buildings		
III—*Repairs*—		
(*a*) Machinery	7,511	3,073
(*b*) Pipe line	3,984	552
(*c*) Overhead line	38,114	12,141
(*d*) Buildings	3,925	381
IV—Rents		322
V—Printing	Included in item 1 (*h*).	100
VI—Stationery		500
VII—Insurance		347*
VIII—Total maintenance charges	1,80,635	48,965
IX—Interest and sinking fund charges	1,98,122	1,10,417
X—Total annual charges	3,78,757	1,59,382
XI—Total units generated	3,384,851	1,102,780
XII—Total units sold	3,031,367	700,246
XIII—Cost per unit generated Annas ..	1·56	2·31
XIV—Cost per unit sold .. .. Annas ..	2·00	3·64

*Rupees 180 for work done for private individual and Rs.167 for refund.

APPENDIX P

Electric Supply.

Annual Maintenance Account.

1933-34.

Particulars of charges	Hardwar
I—*Staff charges*—	Rs.
(*a*) Direction	3,783
(*b*) Office establishment	1,397
(*c*) Sub-station staff	972
(*d*) Overhead line staff	2,622
(*e*) Contingencies	992
II—Cost of electric energy purchased during the year from Irrigation Department	55,208
III—*Materials*—	
(*a*) Oils	Nil.
(*b*) Lubricants	Nil.
(*c*) Waste	Nil.
(*d*) Buildings	Nil.
IV—*Repairs*—	
(*a*) Machinery	Nil.
(*b*) Overhead line including cost of bulbs	1,964
(*c*) Buildings	84
V—Rents	60
VI—Printing	Nil.
VII—Stationery	70
VIII—Insurance	Nil.
IX—Miscellaneous	164
X—Total maintenance charges	67,215
XI—Interest and sinking fund charges	14,752
XII—Total annual charges	81,967
XIII—Total receipt during the year	89,467
XIV—Total units purchased	488,652
XV—Total units sold	463,200
XVI—Profits during the year	7,500
XVII—Total loss in transformer and transmission, etc. .. Units	25,452
XVIII—Cost per unit purchased .. .. .. Annas..	2·68
XIX—Cost per unit sold .. .. Annas..	2·88

APPENDIX Q

A—List of projects finally sanctioned during the year 1933-34

I—Provincial

(*a*) *Fair projects*—

		Rs.
1.	Allahabad Magh Mela water supply and maintenance for 1933-34 ..	13,993
2.	Allahabad Magh Mela electrification for 1933-34	10,333
3.	Allahabad Magh Mela water supply and maintenance of pumping plant and temporary shed for the year 1933-34	1,395
4.	Dewa (Bara Banki) temporary water supply during fair days in 1933 ..	1,916
5.	Lucknow anti-malaria and Drainage Works, Ghaziuddin Hyder Canal, New Inlet connexions	1,047
6.	Lucknow Ghaziuddin Hyder canal lining, construction of Jiamau Ford ..	1,743
7.	Lucknow Goomti weir maintenance	1,371
8.	Lucknow anti-malaria and drainage, Ghaziuddin Hyder Canal maintenance for 1933-34	7,329
	Total	39,537

I(a) Provincial, Allahabad district Public Works Department Works

		Rs.
1.	Maintenance of steam plant Rasulabad Distillery	2,100
2.	Maintenance of Alfred Park Pumping Station	9,600
3.	Maintenance of Bakshi, Beni and Jumna Bunds	450
4.	Maintenance and Annual Repairs Departmental offices	2,200
5.	Maintenance and Annual Repairs to Accountant-General's Office ..	1,107
6.	Maintenance and Annual Repairs Board of Revenue Office ..	1,150
7.	Maintenance and Annual Repairs to old Superintending Engineer, Public Health Department, and Chief Account's Offices	1,500
8.	Maintenance: Annual Repairs to Government Central Press	1,403
9.	Maintenance: Annual Repairs to Government House	8,161
10.	Maintenance of arboriculture on Provincial Roads..	3,672
11.	Maintenance of electric installation in residential buildings ..	528
12.	Maintenance of electric installation in non-residential buildings ..	4,047
13.	Maintenance of sewage and drainage of Public Offices	225
14.	Maintenance of Pontoon bridge at Rajghat	34,273
15.	Maintenance and Annual Repairs to New High Court	4,900
16.	Maintenance and Annual Repairs to accommodation for travellers ..	85
17.	Maintenance and Annual Repairs to Secretariat	4,240
18.	Maintenance and Annual Repairs to Secretariat Clerks' Quarters ..	1,035
19.	Maintenance and Annual Repairs to Provincial Roads	75,174
20.	Maintenance and Annual Repairs to endowed tombs in Muir Road Cemetry	1,374
21.	Maintenance of Ganges Navigation Works	1,120
22.	Constructing a new police outpost at Khuldabad	37,950
23.	Providing an electric fan in Secretariat Clerks' Quarter no. 6 ..	46
24.	Providing electric light and fan in High Court	36
25.	Maintenance of electric installation in Government House	1,945
26.	Providing a flush lavatory and septic tank, etc. in the residence of the Executive Engineer, Provincial Division	315
27.	Survey expenses for preparing road plans	126
28.	Repairs and Carriage of Tools and Plant	2,273
29.	Annual Repairs to Government buildings amount not exceeding Rs.1,000	5,289
30.	Rasulabad Distillery Water Supply Improvement at Allahabad ..	7,175
	Total	2,14,299

(*b*) *Preliminary Proposal*—

Nil

(*c*) *Forecasts of cost*—

1.	Banda, New Revenue Police Lines Sinking 4" pipes in 2 existing wells ..	1,500
	Total	1,500

II—Deposit Works

(*a*) *Fair projects*—

1.	Agra water supply, providing boosting pumps for improvements of the Cantonment water-supply	26,799
2.	Agra water supply, Metering connexions in the low lying areas ..	48,000
3.	Bauhhulpura Drainage, proposed diversion of Rampur-Tanda Drain ..	460
4.	Bareilly anti-malaria Works completion of portion of storm water drain in Jail compound, etc.	11,507
5.	Brindaban Infectious Diseases Hospital, making the existing open drain pucca for 800 feet length	1,621
6.	Dehra Dun Infectious Diseases Hospital, electrification of the hospital..	1,142
7.	Fyzabad water supply extension, 2nd supplementary estimate ..	2,537
8.	Gorakhpur Drainage, second instalment, revised estimate	1,02,994
9.	Hardwar Union water supply extension, constructing a fourth tube-well with pumping plant	54,836
10.	Hardwar, construction of water flushed urinals	2,728
11.	Hardwar Water Supply Extension, fourth tube-well at Mayapur, revised estimate	13,526
	Total	2,66,151

(*b*) *Preliminary proposals*—

Nil

APPENDIX Q—(*continued*)

II—Deposit Works—(*continued*)

(*c*) *Forecasts of cost*—

		Rs.
1.	Agra drainage, providing galvanised sheet iron channels and sal ballies trestles for carrying sewage from the Strand Road to the existing sewage farm	6,093
2.	Allahabad pumping plant for two tube-wells in Civil Lines	72,000
3.	Hardwar water supply, providing a chlorinating plant at Tibri reservoir	19,700
4.	Moghalsarai water supply, revised	24,004
5.	Moradabad drainage, improvements to the existing sewage system ..	48,000
6.	Muttra, improvements to the Infectious Diseases Hospital ..	3,800
7.	Muttra, construction of the drains behind R.A.T.C. Lines ..	11,300
	Total	1,79,742

B—List of Projects submitted but not sanctioned during the year 1933-34

I—Provincial

(*a*) *Fair projects*—

		Rs.
1.	Allahabad Magh Mela water supply Improvement, Fire protection arrangement	8,032
2.	Allahabad Magh Mela, erection, maintenance and dismantling of temporary boat bridge	6 500
3.	Allahabad Magh Mela Water Supply and repairs and maintenance of pumping plant and temporary shed for 1934-35	825
4.	Khaga, District Fatehpur, 5 feet masonry well in the compound of Post Office	2,460
5.	Sanitary fittings and drainage of lavatories in Chief Engineer and Superintending Engineer, Public Health Department's office, revised..	6,087
	Total	24,804

I(*a*)—*Provincial, Allahabad District, Public Works Department works*—

		Rs.
1.	Additions and alterations to Civil Aerodrome	2,547
2.	Annual repairs and maintenance of roads (revised estimate)	83,174
3.	Annual repairs to Secretariat clerks' quarters (revised estimate) ..	1,642
4.	Fixing chain and belt in the pump in residence of the Executive Engineer, Provincial Division	393
5.	Magh Mela River Training works	1,500
6.	Maintenance of steam plant at Rasulabad (revised estimate).. ..	2,800
7.	Special repairs to Secretary's residence, set no. 1	1,004
8.	Special repairs to damages caused by earthquake to Government buildings	32,699
	Total ..	1,25,765

(*b*) *Preliminary proposals*—

1.	Allahabad District, Public Works Department reconstruction of roads ..	1,12,000

(*c*) *Forecasts of cost*—

1.	Allahabad District Jail, drainage of a portion of Jail and Jailor's quarters	5,025
2.	Banda—Tube-well in the District Jail	20,000
3.	Lucknow Central Jail—metalling an electric driven centrifugal pumping set	6,150
4.	Muhammadpur (Bara Banki) 4" tube-well with a suitable hand pump for the police station	2,421
.	Nagla Chand (Meerut) 3" tube well with a suitable hand pump in the compound of Ganges Canal Inspection House	2,500
6.	Nidhauli (Etah)—Repairs to the existing well at the police station and sinking a tube-well	2,000
7.	Rural sanitation village water supply for installing hand pumps ..	16,500
	Total ..	1,66,696

II—Deposit Works

(*a*) *Fair projects*—

1.	Agra, Dayal Bagh drainage	1,89,132
2.	Allahabad, two tube-wells in Civil Lines area (revised estimate) ..	40,977
3.	Cawnpore Permat Sewage Pumping Station re-organization	2,07,408
4.	Dehra Dun extension of the sewage farm	16,166
5.	Dehra Dun Lakhibagh drainage	69,386
6.	Hardwar water supply extension, 4' tube-well at Mayapur (second revised estimate)	13,841
7.	Lucknow anti-malaria and drainage work Ghaziuddin Hyder Canal, construction of municipal inlets	4,495
8.	Lucknow anti-malaria and drainage works, construction of Dareeba and Mawaiya inlets	557
9.	Muttra, improvements to the Infectious Diseases Hospital	3,803
	Total ..	5,39,764

(*b*) *Preliminary proposals*—

Nil.

(*c*) *Forcasts of cost*—

1.	Agra Cantonment drainage	6,36,500
2.	Allahabad metering and waste prevention in Ward no. V	5,700
3.	Ballia meat market	2,029
4.	Cawnpore Cantonment water supply	3,31,000
5.	Deoria drainage	21,164
6.	Dewa (Bara Banki) fair electric supply	20,756

APPENDIX Q—(*concluded*)

		Rs.
7.	Dewa (District Bara Banki)—	
	(i) Town water supply	12,000
	(ii) Irrigation of Agriculture Farm	9,000
8.	Jhansi water supply, Babina scheme (revised)	26,45,845
9.	Meerut, experimental compost factory for the conversion of municipal wastes into humus	1,800
10.	Muttra water supply, proposed arrangement for high zone supply ..	66,000
	Total ..	38,11,794

(*d*) *Special reports*—

1.	Bara Banki water supply	80,000

C—List of projects under preparation with approximate estimated amount

I—Provincial Works

(*a*) *Fair projects*—

		Rs.
1.	Magh Mela water supply and maintenance for 1934-35	7,400

(*b*) *Preliminary proposals*—

Nil.

(*c*) *Forecasts of cost*—

Nil.

II—Deposit works

(*a*) *Fair projects*—

1.	Benares drainage	2,86,000
2.	Cawnpore drainage, Part VI	2,36,000
3.	Deoria drainage	24,000
4.	Etawah water supply	1,50,000
5.	Fyzabad water supply, a tube-well near the existing tube-well no. 3 (revised estimate)	13,694
6.	Ghazipur water supply	1,82,000
7.	Ghazipur water supply—a trial tube-well (revised estimate) ..	12,669
8.	Hardwar water supply, providing a chlorinating plant for Tibri reservoir	13,700
9.	Hathras water supply, revision of	3,91,000
10.	Kosi drainage	Not known.
11.	Planning of Bhopatwala, Hardwar, Training of Bagh Rao	,,
12.	Tanyard godown and hide curing godown type design	25,000
	Total ..	13,24,033

(*b*) *Preliminary proposals*—

1.	Dehra Dun water supply extension (Bandal River)	Not known.

(*c*) *Forecasts of cost*—

1.	Almora water supply extensions	1,05,000
2.	Almora Hydro-electric project	4,00,000
3.	Bijnor drainage	Not known.
4.	Jaunpur drainage improvement	1,00,000
5.	Stevensonganj drainage, Unao	12,000
	Total ..	6,17,000

D—List of works delayed for want of staff

Projects—

1. Brindaban water supply, revision of.
2. Cawnpore drainage, Part VI.
3. Construction of main outfall sewar at Muzaffarnagar.
4. Ghazipur water supply.
5. Hardwar sewage farm.
6. Tanyard godown and hide curing godown type design.
7. Dewa town water supply.
8. Dewa irrigation of proposed agricultural farm.

Completion reports—

1. Agra water supply, new mechanical filters.
2. Agra water supply, extension to raw water pumping plant.
3. Almora water supply.
4. Banbhulpura drainage.
5. Brindaban Infectious Diseases Hospital.
6. Chirgaon drainage.
7. Dehra Dun Infectious Diseases Hospital.
8. Dehra Dun water softening and chlorinating plant.
9. Fatehpur-Sikri Mela water supply.
10. Fyzabad water supply.
11. Gorakhpur drainage.
12. Hardwar, additions to Infectious Diseases Hospital.
13. Kaimganj drainage.
14. Kosi water supply report.
15. Lucknow, overflow jail water supply.
16. Lucknow, Ghaziuddin Hyder Canal and drainage works.
17. Lucknow, sewage pumping station.
18. Lucknow, Government House unfiltered water supply.
19. Moghalsarai drainage.
20. Muttra water supply extension tube-well.
21. Muzaffarnagar New Mandi drainage.
22. Piran Kaliar water supply (Roorkee).
23. Rikhikesh Infectious Diseases Hospital.
24. Unao drainage.

APPENDIX R

Revenue derived from sewage farms during the year 1933-34

Serial number	Particulars	Agra	Allahabad	Dehra Dun	Lucknow	Muttra
1	Area under cultivation in acres	100	225	4·19	(1)685	64·04
2	Total rent demanded from cultivators .. Rs.	6,252	22,588	500	13,401	6,541
3	Average rent per acre per annum	120	88	119	54	111
4	Quantity of sewage treated in million gallons.	Not available.	(2) 912,669,000	1,226,832	Not supplied for want of meter.	47,069,316
5	Average quantity of sewage consumed per acre per diem.		9,180	800		3,326
6	Expenditure incurred on the maintenance of the farms.	566	(3)32,165	..	(4)3,512	4,647
7	Revenue derived .. Rs.	6,252	(5)20,124	500	16,175	7,117
8	Profit .. .. "	5,685	Nil	500	(6)12,662	2,469
9	Loss .. .. "	Nil	70 %	..	..	..

(1) Of this only 178 acres are treated with sewage.
(2) Municipal farms—854,508,850 gallons; Agricultural Institute 58,180,150, gallons.
(3) Municipal farm—Rs.1,995 pumping station Rs.30,170.
(4) This amount does not include Rs.14,100 paid in repayment of interest and sinking fund on loans.
(5) Municipal farm—Rs. 17,036, Agricultural Institute Rs 3,088.
(6) If the amount paid towards repayment of interest and sinking fund of loans taken for the farm is included on the farm, there will be a loss of Rs.1,437. It also does not include Rs. 33,222 incurred in connexion with the maintenance of Pumping Plant.

APPENDIX S.

Statement of expenditure on construction works carried out by the Engineering Branch of the Public Health Department during 1933–34.

Serial number	Name of works	Estimated cost	Total expenditure up to the end of March, 1933	Expenditure incurred during the year
	I—PROVINCIAL	Rs.	Rs.	Rs.
	(a) *Public Health Department Works*			
1	Allahabad Magh Mela—Water Supply for 1933-34 ..	12,920	..	12,319
2	Allahabad Magh Mela—Maintenance for 1933-34 ..	1,073	..	551
3	Allahabad Magh Mela—Water Supply and Maintenance for 1933-34.	1,305	..	926
4	Allahabad Magh Mela—Electrification for 1933-34 ..	10,833	..	10,832
5	Allahabad Magh Mela—Erection, maintenance and dismantling of temporary boat bridge.	6,500	..	6,500
6	Banda New Reserve Police Line—Sinking 4" pipe in wells.	1,500	..	703
7	Dewa (Bara Banki) Water Supply	57,859	14,437	23,882
8	Dewa (Bara Banki) fair temporary water supply, 1933..	1,916	..	1,564
9	Lucknow Anti-malarial and drainage works—Ghazi-ud-din Hyder Canal Maintenance, 1933-34.	6,815	..	4,999
10	Lucknow Anti-malarial and drainage works—Ghazi-ud-din Hyder Canal—Construction of inlets.	514	..	514
11	Lucknow, Replacing the washed out crossing for Jiamau across the lining of Ghazi-ud-din Hyder Canal.	1,743	..	1,113
12	Lucknow Goomti Weir Maintenance, 1933-34 ..	1,371	..	991
13	Lucknow—Providing lavatories and sanitary fittings in Superintending Engineer, Public Health Department, and Chief Engineer's offices.	6,987	..	5,767
14	Meerut, roads and drainage improvements in front of Office of Executive Engineer, I Division, Public Health Department.	1,413	522	886
15	Meerut—Maintenance and repairs of the office of Executive Engineer, I Division, Public Health Department.	1,260	..	1,200
				72,248
	(b) *Allahabad District Works, Public Works Department*			
	(i) *Central*			
1	Annual repairs to endowed tombs in the Muir Road Cemetery.	1,374	..	1,319
	(ii) *Provincial*			
2	Annual repairs to Government House	8,161	..	7,916
3	Annual repairs to steam plant at Rasulabad Distillery	2,800	..	2,522
4	Annual repairs to Private Secretary's Office ..	343	..	254
5	Annual repairs to Secretariat, Block no. 1 ..	4,240	..	4,211
6	Annual repairs to Departmental office Block no. 2 ..	2,200	..	2,327
7	Annual repairs to Accountant-General's Office ..	1,107	..	1,113
8	Annual repairs to Board of Revenue Block no. 4 ..	1,150	..	935
9	Annual repairs to old Consulting Architect and Superintending Engineer's Office.	1,500	..	1,291
10	Annual repairs to House no. 1 for members of Executive Council.	776	..	548
11	Annual repairs to New High Court	4,900	..	4,619
12	Annual repairs to Government Press	1,403	..	1,334
	Carried over ..			28,389

APPENDIX S—(*continued*)

Statement of expenditure on construction works carried out by the Engineering Branch of the Public Health Department during 1933–34.

Serial number	Name of works	Estimated cost.	Total expenditure up to the end of March, 1933	Expenditure incurred during the year
	(*b*) *Allahabad District Works, Public Works Department*—(continued)	Rs.	Rs.	Rs.
	(*ii*) *Provincial*—(continued)			
	Brought forward ..	..	..	23,889
13	Annual repairs to monuments and antiquities ..	583	..	334
14	Annual repairs to old Superintending Engineer's office	280	..	264
15	Annual repairs to Executive Engineer's office ..	600	..	505
16	Annual repairs to combined Public Works Department office.	490	..	425
17	Annual repairs to Public Works Department Godown ..	480	..	482
18	Annual repairs to Superintending Engineer's residence	433	..	432
19	Annual repairs to Executive Engineer's residence ..	401	..	312
20	Annual repairs to Assistant Engineer's residence ..	216	..	171
21	Annual repairs to Assistant Engineer's residence, Government House Sub-division.	249	..	194
22	Annual repairs to Court of Wards Office	128	..	126
23	Annual repairs to residence of Superintendent, Government Press.	258	..	257
24	Annual repairs to portion of Private Secretary's Office occupied by Head Assistant.	102	..	56
25	Annual repairs to Secretariat Clerks' Quarters ..	1,643	..	1,323
26	Annual repairs to accommodation for travellers on I-A—Provincial Roads.	85	..	85
27	Annual repairs, Maintenance, Collection on I-A—Provincial Roads.	21,835	..	21,785
28	Annual repairs, Maintenance, Consolidation on I-A—Provincial Roads.	11,209	..	11,185
29	Maintenance of electric installation in Government House.	1,045	..	1,013
30	Maintenance of electric installation in non-residential buildings.	4,822	..	4,512
31	Maintenance of electric installation in residential buildings.	528	..	526
32	Maintenance of I-A—Provincial Roads	50,130	..	50,079
33	Maintenance of Arboriculture on I-A Provincial Roads..	3,672	..	3,517
34	Maintenance of pontoon bridge and ferries at Rajghat..	34,273	..	24,963
35	Maintenance of electric installation in Inspection House	25	..	16
36	Maintenance of Alfred Park Pumping Station ..	9,600	..	8,313
37	Maintenance of Ganges Navigation works ..	1,120	..	563
38	Maintenance of Bakshi, Beni and Jumna bunds ..	450	..	253
39	Maintenance of Sewage and Drainage to Public Offices	225	..	130
40	Providing brackets, lights and fans in the High Court..	36	..	23
41	Provision of one bracket light and fixation of two ceiling fans in the two rooms occupied by the Stenographers of Criminal Investigation Department in the Secretariat Block no. 2.	Sanction to estimate is awaited.	..	44
	Carried over ..	..	..	1,60,354

APPENDIX S—(*concluded*)

Statement of expenditure on construction works carried out by the Engineering Branch of the Public Health Department during the year 1933–34

Serial number	Name of works	Estimated cost	Total expenditure up to the end of March, 1933	Expenditure incurred during the year
	(*b*) *Allahabad District Works, Public Works Department*—(concluded)	Rs.	Rs.	Rs.
	(ii) *Provincial*—(concluded)			
	Brought forward ..	..	..	1,60,354
42	Rasulabad Distillery water supply improvement ..	7,175	..	3,414
43	Magh Mela River training works	1,500	..	953
44	Replacing ceiling cloth in office room and one bed-room in Executive Engineer, Provincial Division's residence.	88	..	86
45	Special repairs to the Secretary's residence no. 1 ..	Sanction to estimate is awaited.	..	596
46	Special repairs to buildings damaged by earthquake ..	32,699	..	7,220
				1,72,619
	II—*Deposit Works*			
1	Agra cantonment water supply improvements, providing boosting pumps.	26,799	..	11,561
2	Ajodhya, two tube wells	37,112	14,120	..
3	Allahabad Civil Lines, two tube wells	41,133	1,020	3,514
4	Bareilly Anti-malarial works, storm water drain in Jail compound.	11,507	..	34
5	Brindaban Infectious Diseases Hospital	44,636	25,652	6,790
6	Dehra Dun Infectious Diseases Hospital	46,621	32,121	140
7	Dehra Dun water softening and chlorinating plant ..	81,609	46,900	14,108
8	Fyzabad water supply extension	57,806	35,582	1,772
9	Fyzabad water supply extension—a tube well near Tube Well no. 3.	12,083	318	78
10	Ghazipur trial tube-well	19,770	..	11,656
11	Gorakhpur Drainage, II instalment (revised) ..	1,02,994	26,159	74,417
12	Hardwar—Additions to Infectious Diseases Hospital ..	24,990	..	23,636
13	Hardwar water supply extension, Mayapur 4th tube-well.	13,526	430	12,661
14	Hardwar Adh-Kumbh Mela water supply, 1933 ..	7,272	2,531	1,475
15	Hathras water supply	5,32,741	123	1,72,596
16	Hathras water supply tube-well nos. 3, 4 and 5 ..	34,800	33,331	127
17	Hathras water supply—a 12" strainerless tube well no. 2.	23,242	..	178
18	Jaunpur water supply scheme	4,11,037	9,629	413
19	Kaimganj drainage scheme	60,415	58,978	..
20	Kanauj drainge, Block "E."	15,097	742	..
21	Lucknow, Inlets for Mawaiya Sewer and Dareeba open drains to Ghazi-uddin Hyder Canal lining and sewer.	557	..	14
22	Moradabad flushing scheme, installation of electric motor.	3,601	2,793	232
23	Muttra water supply, additional tube well no. 5 ..	55,311	46,307	1,915
24	Muzaffarnagar New Mandi drainage	4,63,447	1,46,716	2,921
25	Rishikesh Infectious Diseases Hospital	33,039	31,371	142
26	Sandila, Nawab Muhammad Yusuf Meat Market (revised).	9,687	8,494	127
27	Unao drainage scheme	1,89,316	72,024	58,647
				3,99,207

STATEMENTS SHOWING RATES OF INCREASE OF MUNICIPAL WATER SUPPLY IN THE UNITED PROVINCES FROM THE YEAR 1923-24 TO 1933-34.

AGRA WATER-WORKS

Particulars	Years										
	1923–24	1924–25	1925–26	1926–27	1927–28	1928–29	1929–30	1930–31	1931–32	1932–33	1933–34
1. Quantity of water consumed—											
(a) Metered .. .. .. Million gallons	216·769	215·219	248·789	261·580	265·864	293·966	308·880	330·209	306·533	287·573	299·818
(b) Unmetered .. .. "	1,457·534	1,427·792	1,417·342	1,427·587	1,531·578	1,614·415	1,761·280	1,715·511	1,729·537	1,488·027	1,409·092
Total "	1,674·303	1,643·011	1,666·131	1,689·167	1,797·442	1,908·881	2,070·110	2,045·720	2,036·070	1,775·600	1,708·910
2. Consumption per head per day in gallons.. ..	24·60	24·21	24·54	24·89	26·41	28·12	30·50	30·14	24·21	21·17	20·38
3. Number of connexions—											
(a) Metered	13	164	187	211	211	232	277	341	377	320	287
(b) Unmetered	3,663	3,975	4,290	4,407	4,612	4,819	4,978	5,086	5,250	5,417	5,612
Total ..	3,301	4,139	4,477	4,618	4,823	5,051	5,255	5,427	5,627	5,737	5,899
4. Number of standposts	399	422	457	477	503	527	579	585	590	623	648
5. Expenditure in thousands—											
(a) Maintenance .. .. .. Rupees	161·64	170·78	182·16	178·75	166·57	173·98	138·62	167·84	168·94	150·27	164·66
(b) Interest and sinking fund.. .. "	65·22	65·12	60·04	54·11	50·46	68·21	68·01	66·57	66·57	63·37	65·33
Total "	226·86	235·90	242·20	232·86	217·03	242·19	206·63	234·41	235·51	213·64	229·99
6. Cost per thousand gallons maintenance .. Annas	1·54	1·66	1·75	1·69	1·48	1·46	1·07	1·31	1·33	1·35	1·54
7. Total charges per thousand gallons .. "	2·16	2·29	2·33	2·20	1·93	2·03	1·60	1·83	1·85	1·92	2·15
8. Revenue in thousands—											
(a) Unmetered .. .. .. Rupees	156·14	159·69	173·02	178·04	178·15	172·07	166·85	193·37	199·73	203·43	212·11
(b) Metered .. .. .. "	79·28	65·92	91·09	90·86	106·53	117·43	123·88	100·35	89·13	92·08	101·46
Total "	235·42	225·61	264·11	268·90	284·68	289·50	290·73	293·72	288·86	295·51	313·57
9. Receipt per thousand gallons through—											
(a) Metered supplies .. .. Annas	5·85	4·90	5·36	5·56	6·41	6·39	6·42	4·86	4·65	5·12	5·41
(b) Assessment and ferrule rating .. "	1·71	1·79	1·95	1·99	1·86	1·70	1·52	1·80	1·85	2·19	2·41
10. Profit or deficit in thousands .. Rupees	+8·56	−10·29	+21·91	+36·04	+67·65	+47·31	+84·16	+59·31	+53·35	+81·87	+83·58

ALLAHABAD WATER-WORKS

Particulars		Years										
		1923-24	1924-25	1925-26	1926-27	1927-28	1928-29	1929-30	1930-31	1931-32	1932-33	1933-34
1. Quantity of water consumed—												
(a) Metered	Million gallons	236·342	143·572	196·744	175·113	175·894	157·662	143·336	154·480	154·162	145·371	133·116
(b) Unmetered	" ..	1,193·075	1,149·713	1,096·286	1,086·090	1,219·172	1,702·411	1,839·692	2,061·916	1,948·540	1,923·549	2,089·534
Total	" ..	1,429·417	1,293·285	1,293·030	1,261·203	1,395·066	1,860·073	1,983·028	2,216·396	2,102·702	2,068·920	2,222·650
2. Consumption per head per day in gallons ..		24·84	22·53	22·53	21·98	24·24	32·41	34·55	38·62	31·24	30·82	33·11
3. Number of connexions—												
(a) Metered		418	436	461	339	306	345	346	370	373	375	381
(b) Unmetered		5,111	5,345	5,509	5,373	5,634	5,913	6.125	6,364	6,707	7,010	7,370
Total ..		5,529	5,781	5,970	5,712	5,940	6,258	6,471	6,734	7,080	7,385	7,751
4. Number of standposts		385	395	416	522	536	596	594	621	639	661	711
5. Expenditure in thousands—												
(a) Maintenance	Rupees	209·32	170·13	166·87	181·37	179·33	178·34	205·60	239·90	225·33	230·19	243·39
(b) Interest and sinking fund ..	"	35·00	140·38	139·00	124·80	115·37	128·73	156·05	157·40	149·82	146·18	146·21
Total	"	244·32	310·51	305·87	306·67	294·70	307·07	361·65	397·30	375·15	376·37	389·60
6. Cost per thousand gallons maintenance..	Annas	2·34	2·10	2·06	2·31	2·06	1·53	1·66	1·73	1·71	1·78	1·75
7. Total charges per thousand gallons ..	"	2·73	3·83	3·78	3·89	3·38	2·64	2·92	2·87	2·85	2·91	2·80
8. Revenue in thousands—												
(a) Unmetered	Rupees	268·31	293·09	270·75	283·39	290·92	304·76	352·17	351·82	407·96	419·59	414·90
(b) Metered	"	69·48	63·03	59·15	73·40	74·98	75·61	61·44	62·48	63·19	87·41	65·17
Total	"	337·79	356·12	329·90	362·79	365·85	380·37	413·61	414·30	471·15	507·00	480·07
9. Receipt per thousand gallons through—												
(a) Metered supplies	Annas	4·70	7·02	4·31	6·71	6·82	7·67	6·86	6·47	5·56	9·63	7·83
(b) Assessment and ferrules rating ..	"	3·00	4·08	3·95	4·26	3·82	3·86	3·06	2·73	3·35	3·49	3·13
10. Profit or deficit in thousands.. ..	Rupees	+93·47	+45·61	+24·03	+56·12	+71·15	+79·30	+51·96	+17·00	+96·00	+130·63	+90·47

BENARES WATER-WORKS

Particulars	Years										
	1923-24	1924-25	1925-26	1926-27	1927-28	1928-29	1929-30	1930-31	1931-32	1932-33	1933-34
1. Quantity of water consumed—											
(a) Metered .. .. Million gallons	3·838	5·361	11·575	19·144	27·247	30·771	34·323	50·793	48·495	66·960	67·480
(b) Unmetered .. .. .. "	2,208·441	2,218·339	2,264·090	2,403·714	2,327·264	2,768·813	2,343·628	2,625·867	2,740·095	2,720·912	2,688·783
Total "	2,212·279	2,223·700	2,275·665	2,422·858	2,354·511	2,799·584	2,377·951	2,676·660	2,788·590	2,787·872	2,756·263
2. Consumption per head per day in gallons ..	30·46	30·70	31·41	33·45	32·42	38·65	32·83	36·95	37·11	37·20	36·78
3. Number of connexions—											
(a) Metered	5	10	42	82	117	140	150	161	177	233	303
(b) Unmetered	11,663	12,148	12,488	12,620	12,634	12,807	13,939	14,872	15,789	16,516	17,034
Total ..	11,668	12,158	12,530	12,702	12,751	12,947	14,089	15,033	15,966	16,749	17,337
4. Number of standposts	433	432	432	437	437	443	465	478	506	512	512
5. Expenditure in thousands—											
(a) Maintenance .. .. .. Rupees	233·85	224·95	218·82	202·30	193·50	200·56	214·40	234·52	231·47	230·65	216·55
(b) Interest and sinking fund .. "	199·79	113·51	103·86	114·17	106·11	104·74	102·05	90·25	88·09	88·09	88·09
Total "	433·64	338·46	322·68	316·47	302·61	305·30	316·45	324·77	319·56	318·74	304·64
6. Cost per thousand gallons maintenance.. Annas	1·69	1·62	1·54	1·34	1·34	1·14	1·44	1·40	1·33	1·32	1·26
7. Total charges per thousand gallons .. "	3·13	2·43	2·27	2·09	2·06	1·74	2·13	1·94	1·83	1·83	1·77
8. Revenue in thousands—											
(a) Unmetered .. .. .. Rupees	263·74	268·75	241·69	254·21	227·51	441·79	440·99	305·48	339·92	315·78	377·04
(b) Metered .. .. .. "	9·94	11·21	6·20	9·30	11·02	8·65	6·18	4·68	12·77	36·74	32·84
Total "	273·68	279·96	247·89	263·51	238·53	450·44	447·17	310·16	352·69	352·52	409·88
9. Receipt per thousand gallons through—											
(a) Metered supplies .. .. Annas	*8·12	33·44	8·57	7·77	6·47	4·50	2·88	1·47	4·21	8·78	7·78
(b) Assessment and ferrule rating .. "	1·91	1·98	1·71	1·69	1·56	2·55	8·01	1·36	1·98	1·86	2·24
10. Profit or deficit in thousands.. .. Rupees	—159·96	—58·50	—74·79	—52·96	—64·08	+145·14	+130·72	—14·61	+33·13	+33·78	+105·24

* Worked on the actual receipt Rs.1,949.

Figures for standposts includes number of road watering posts as they have also got cocks fitted on them for public use.

CAWNPORE WATER-WORKS

Particulars	Years										
	1923-24	1924-25	1925-26	1926-27	1927-28	1928-29	1929-30	1930-31	1931-32	1932-33	1933-34
1. Quantity of water consumed—											
(a) Metered .. .. Million gallons.	594·797	542·580	557·950	603·782	618·188	701·066	743·895	788·278	818·797	894·288	802·445
(b) Unmetered .. .. .. "	1,716·222	1,847·023	1,888·358	1,872·596	1,846·601	2,189·987	2,157·055	2,233·022	2,379·543	2,275·512	2,384·855
Total "	2,311·019	2,389·603	2,446·308	2,476·378	2,464·789	2,891·053	2,900·950	3,021·300	3,198·340	3,169·800	3,187·300
2. Consumption per head per day in gallons	29·17	30·26	30·97	31·35	31·12	36·60	36·72	38·24	35·85	35·63	35·82
3. Number of connexions—											
(a) Metered	932	963	998	1,061	1,061	1,188	1,313	1,477	1,641	1,873	2,174
(b) Unmetered	6,683	7,064	7,470	7,748	7,994	8 556	9,009	9,608	10,114	10,731	11,311
Total ..	7,615	8,027	8,468	8,809	9,055	9,744	10,412	11,085	11,755	12,607	13,485
4. Number of standposts	264	272	276	282	284	296	309	327	338	355	378
5. Expenditure in thousands—											
(a) Maintenance .. .. .. Rupees	307·73	373·16	299·33	266·98	253·61	318·71	296·87	294·34	303·93	276·50	301·61
(b) Interest and sinking fund .. .. "	78·99	34·52	34·52	34·52	34·52	34·52	34·52	34·52	34·52	34·52	34·52
Total "	386·72	407·68	333·85	301·50	288·13	353·23	331·39	328·86	338·45	311·11	336·13
6. Cost per thousand gallons maintenance .. Annas	2·13	2·41	1·96	1·73	1·65	1·76	1·64	1·56	1·55	1·40	1·52
7. Total charges per thousand gallons .. "	2·67	2·64	2·18	1·95	1·87	1·95	1·83	1·74	1·72	1·57	1·69
8. Revenue in thousands—											
(a) Unmetered .. .. .. Rupees	353·07	331·16	365·15	375·18	394·50	389·81	403·88	375·30	414·51	411·74	444·30
(b) Metered .. .. .. "	82·29	111·41	108·39	110·55	123·07	132·48	157·48	140·11	177·60	173·14	170·48
Total "	435·36	442·57	473·54	485·73	517·57	522·29	561·36	515·41	592·11	584·88	614·78
9. Receipt per thousand gallons through—											
(a) Metered supplies .. .. Annas	2·21	3·28	3·12	2·93	3·18	3·02	3·39	2·84	3·47	3·10	3·40
(b) Assessment and ferrule rating .. "	3·29	2·87	3·09	3·21	3·42	2·65	2·99	2·69	2·79	2·90	2·98
10. Profit or deficit in thousands .. .. Rupees	+48·64	+34·89	+130·69	+184·23	+229·44	+169·06	+229·97	+186·55	+248·66	+273·77	+278·65

LUCKNOW WATER-WORKS

Particulars	Years										
	1923-24	1924-25	1925-26	1926-27	1927-28	1928-29	1929-30	1930-31	1931-32	1932-33	1933-34
1. Quantity of water consumed—											
(a) Metered .. .. Million gallons	210·183	209·181	254·628	290·639	297·713	360·526	339·025	449·042	438·583	434·600	418·684
(b) Unmetered .. .. ,,	825·797	1,287·769	1,456·317	1,416·111	1,521·917	1,914·129	1,806·095	2,179·382	2,366·619	2,605·425	2,808·749
Total ,,	1,035·980	1,496·950	1,710·940	1,706·750	1,819·630	2,274·655	2,145·120	2,628·424	2,805·202	3,040·025	3,227·433
2. Consumption per head per day in gallons ..	14·06	20·37	23·28	23·23	24·69	30·95	29·19	34·29	35·16	38·21	40·56
3. Number of connexions—											
(a) Metered	247	318	383	389	422	443	472	510	511	528	550
(b) Unmetered	5,586	5,974	7,017	7,700	8,323	9,033	9,591	10,425	11,206	12,066	12,802
Total ..	5,833	6,292	7,400	8,089	8,745	9,476	10,063	10,935	11,717	12,594	13,352
4. Number of standposts	*446	*397	421	426	434	444	447	*447	530	531	621
5. Expenditure in thousands—											
(a) Maintenance .. .. .. Rupees	217·92	243·13	249·35	225·32	204·72	239·75	266·21	287·01	280·74	297·36	359·43
(b) Interest and sinking fund .. ,,	126·73	140·62	218·97	106·55	246·23	107·30	55·39	146·94	157·37	156·86	157·32
Total ,,	344·65	383·75	468·32	331·87	450·95	347·05	321·60	433·95	438·11	454·22	516·75
6. Cost per thousand gallons maintenance .. Annas	3·36	2·59	2·33	2·11	1·80	1·69	1·99	1·75	1·60	1·56	1·78
7. Total charges per thousand gallons .. ,,	5·31	4·09	4·33	3·11	3·96	2·44	2·40	2·64	2·50	2·39	2·56
8. Revenue in thousands—											
(a) Unmetered .. .. .. Rupees	190·97	285·48	291·17	360·13	352·32	371·88	401·27	388·17	401·82	478·60	489·62
(b) Metered .. .. .. ,,	89·05	119·12	150·21	126·72	119·94	137·20	122·37	151·84	162·27	170·31	156·38
Total .. ,,	280·02	404·60	441·38	486·85	472·26	509·08	523·64	540·01	564·09	648·91	646·00
9. Receipt per thousand gallons through—											
(a) Metered supplies .. .. Annas	6·77	9·11	9·44	6·98	6·44	6·09	5·77	5·41	5·92	6·27	5·98
(b) Assessment and ferrule rating .. ,,	3·70	3·54	3·20	4·07	3·70	3·11	3·55	2·35	2·72	2·94	2·79
10. Profit or deficit in thousands .. Rupees	—64·63	+20·85	—26·94	+154·98	+21·31	+162·03	+202·04	+106·06	+125·98	+194·69	+129·25

* Figures supplied by the Superintendent, Water-works.

MEERUT WATER-WORKS

Particulars	Years										
	1923-24	1924-25	1925-26	1926-27	1927-28	1928-29	1929-30	1930-31	1931-32	1932-33	1933-34
1. Quantity of water consumed—											
(a) Metered .. .. Million gallons.	160·989	22·315	11·513	12·047	13·769	17·092	18·692	32·854	18·032	17·217	14·879
(b) Unmetered .. .. ,,	278·593	349·900	360·015	369·055	395·237	402·080	406·407	420·748	465·719	469·807	485·733
Total ,,	439·582	372·215	371·528	381·102	409·006	419·172	425·099	453·602	483·751	487·024	500·612
2. Consumption per head per day in gallons ..	9·80	8·31	13·10	13·43	14·38	14·78	14·99	15·99	14·50	14·63	15·04
3. Number of connexions—											
(a) Metered	24	31	31	31	34	34	37	38	39	40	46
(b) Unmetered	1,160	1,430	1,529	1,622	1,695	1,785	1,977	1,965	2,066	2,034	2,056
Total ..	1,184	1,461	1,560	1,653	1,729	1,819	1,914	2,003	2,105	2,074	2,102
4. Number of standposts	140	138	138	137	138	136	136	140	142	174	179
5. Expenditure in thousands—											
(a) Maintenance .. .. .. Rupees	52·11	41·96	35·73	37·45	43·72	40·23	36·34	32·60	37·90	27·89	30·46
(b) Interest and sinking fund .. ,,	43·15	43·15	45·81	18·83	..	..	..	..	..	..	..
Total ,,	95·26	85·11	81·54	56·28	43·72	40·23	36·31	32·60	37·90	27·89	30·46
6. Cost per thousand gallons maintenance .. Annas	1·90	1·80	1·54	1·57	1·71	1·54	1·37	1·15	1·25	0·92	0·97
7. Total charges per thousand gallons .. ,,	3·47	3·65	3·51	2·36	1·71	1·54	1·37	1·15	1·25	0·92	0·97
8. Revenue in thousands—											
(a) Unmetered .. .. .. Rupees	8·47	12·53	23·49	25·41	24·28	23·89	25·51	26·98	29·39	30·42	31·90
(b) Metered .. .. .. ,,	50·37	7·91	*34·52	†29·04	4·09	5·22	8·84	5·94	5·47	6·71	5·63
Total ,,	58·84	20·44	58·01	54·45	28·37	29·11	34·35	32·87	34·86	37·13	37·53
9. Receipt per thousand gallons through—											
(a) Metered supplies .. .. Annas	5·01	5·07	8·10	7·37	4·75	4·89	7·56	2·89	4·35	6·24	6·06
(b) Assessment and ferrule rating .. ,,	0·49	0·57	1·04	1·10	0·98	0·95	1·00	1·02	1·01	1·04	1·05
10. Profit or deficit in thousands .. Rupees	—36·42	—64·67	—23·53	—1·83	—15·35	—11·12	—1·99	+0·27	—3·04	+9·24	+7·07

*Includes Rs.32,296 Government grant and compensation from Cantonments.

†Includes Rs.23,500 Government grant as compensation from Cantonments.

MUSSOORIE WATER-WORKS

Particulars	Years										
	1923-24	1924-25	1925-26	1926-27	1927-28	1928-29	1929-30	1930-31	1931-32	1932-33	1933-34
1. Quantity of water consumed—											
(a) Metered .. .. Million gallons	12·859	24·201	30·115	30·068	28·638	27·212	42·019	48·381	52·592	53·828	50·779
(b) Unmetered .. .. "	68·699	54·456	57·498	65·760	71·129	79·768	77·264	66·626	76·699	70·439	86·652
Total "	81·558	78·657	87·613	95·828	99·767	106·980	119·283	115·007	129·291	124·277	137·431
2. Consumption per head per day in gallons ..	14·57	14·09	16·19	17·17	17·83	19·17	21·37	20·61	27·05	26·08	28·84
3. Number of connexions—											
(a) Metered	430	448	474	446	471	474	481	498	524	608	735
(b) Unmetered	*28	*46	*50	*76	*59	59	155	16	16	24	24
Total ..	458	494	524	522	530	533	636	514	540	632	759
4. Number of standposts	†49	†49	†49	†49	†49	†52	†52	†59	†65	†92	92
5. Expenditure in thousands—											
(a) Maintenance .. .. .. Rupees	41·95	39·10	44·08	61·57	57·19	65·12	73·22	71·71	84·00	82·19	89·39
(b) Interest and sinking fund .. "	32·98	37·40	17·16	16·61	28·83	28·83	28·82	28·82	41·64	41·64	41·12
Total "	74·93	76·50	61·24	78·18	86·02	93·95	102·05	100·54	125·64	123·83	130·51
6. Cost per thousand gallons maintenance .. Annas	8·23	7·95	8·05	10·28	9·17	9·74	9·82	9·98	10·40	10·58	10·40
7. Total charges per thousand gallons .. "	14·70	15·55	11·18	13·05	13·79	14·05	13·69	13·99	15·55	15·94	15·19
8. Revenue in thousands—											
(a) Unmetered .. .. .. Rupees	43·23	46·32	10·56	8·57	9·12	6·25	46·67	5·79	13·07	12·36	12·97
(b) Metered .. .. .. "	14·30	14·32	49·95	50·15	48·50	61·14	39·48	78·22	83·95	81·52	78·00
Total "	57·53	60·64	60·31	58·72	57·62	67·39	86·15	84·01	97·02	93·88	90·97
9. Receipt per thousand gallons through—											
(a) Metered supplies .. .. Annas	17·80	9·47	26·52	26·69	27·09	35·95	15·04	25·87	25·54	24·23	24·58
(b) Assessment and ferrule rating .. "	10·07	18·61	2·88	2·08	2·05	1·25	9·66	1·39	2·73	2·81	2·40
10. Profit or deficit in thousands .. .. Rupees	—17·40	—15·86	—0·93	—19·46	—28·40	—26·56	—15·90	—16·53	—28·62	—29·95	—39·53

*Figures taken from the Board's Annual Administration Reports.

†Figures for standposts supplied by the Electrical Engineer.

NAINI TAL WATER-WORKS

Particulars	Years										
	1923-24	1924-25	1925-26	1926-27	1927-28	1928-29	1929-30	1930-31	1931-32	1932-33	1933-34
1. Quantity of water consumed—											
(a) Metered .. .. Million gallons	14·020	16·746	17·636	18·221	17·847	19·735	18·922	18·666	21·219	19·788	19·663
(b) Unmetered .. .. ,,	20·939	36·799	29·424	26·740	34·768	41·480	44·674	49·994	50·561	50·669	41·833
Total ,,	34·959	53·545	47·060	44·961	52·615	61·215	63·596	68·660	71·780	70·457	61·496
2. Consumption per head per day in gallons ..	5·51	8·47	7·44	7·11	8·30	9·68	10·06	10·86	13·26	13·05	11·39
3. Number of connexions—											
(a) Metered	284	296	317	305	313	330	354	367	373	395	402
(b) Unmetered	5	5	5	6	5	5	5	7	7	7	7
Total ..	289	301	322	311	318	335	359	374	380	402	409
4. Number of standposts	*73	*72	*72	*72	*72	*72	*72	*72	*70	*73	191
5. Expenditure in thousands—											
(a) Maintenance .. .. .. Rupees	82·11	43·42	44·17	46·72	40·61	47·73	47·33	43·08	59·98	59·30	45·88
(b) Interest and sinking fund .. ,,	23·01	23·02	23·01	25·59	25·59	25·59	25·59	25·59	25·59	25·59	25·59
Total ,,	105·12	66·45	67·18	72·31	66·20	73·32	72·92	68·67	85·57	84·89	71·47
6. Cost per thousand gallons maintenance .. Annas	37·68	12·98	15·02	16·62	12·35	12·47	11·90	10·04	13·37	13·47	11·93
7. Total charges per thousand gallons .. ,,	48·11	19·85	22·84	25·73	20·13	19·16	18·34	16·00	19·07	19·28	18·59
8. Revenue in thousands—											
(a) Unmetered .. .. .. Rupees	45·95	46·91	47·85	47·32	48·00	50·91	52·36	59·99	59·91	64·02	56·40
(b) Metered .. .. .. ,,	21·98	28·79	33·09	30·28	30·49	34·59	35·12	32·95	35·13	34·76	30·97
Total ,,	67·93	75·70	80·95	77·60	78·49	85·50	87·48	92·94	95·04	98·78	87·37
9. Receipts per thousand gallons through—											
(a) Metered supplies .. .. Annas	25·08	27·50	30·00	26·59	27·33	28·04	29·69	28·25	26·49	28·11	25·20
(b) Assessment and ferrule rating .. ,,	35·11	20·30	26·03	28·32	22·09	19·64	18·78	19·20	18·96	20·22	21·57
10. Profit or deficit in thousands .. Rupees	—37·19	+9·25	+13·77	+5·29	+12·29	+12·18	+14·56	+24·27	+9·47	+13·89	+15·90

*Figures for standposts supplied by the Electrical and Mechanical Engineer.

DEHRA DUN WATER-WORKS

Particulars	Years										
	1923-24	1924-25	1925-26	1926-27	1927-28	1928-29	1929-30	1930-31	1931-32	1932-33	1933-34
1. Quantity of water consumed—											
(a) Metered .. .. Million gallons	1·175	1·318	1·221	1·778	3·565	6·240	5·878	7·550	7·897	10·800	10·183
(b) Unmetered .. .. "	64·735	64·413	64·510	108·222	106·435	103·760	104·122	102·450	102·404	99·200	99·817
Total "	65·910	65·731	65·731	110·000	110·000	110·000	110·000	110·000	110·301	110·000	110·000
2. Consumption per head per day in gallons ..	5·28	5·28	5·28	8·84	8·82	8·84	8·84	8·84	7·46	7·46	7·46
3. Number of connexions—											
(a) Metered	14	13	12	29	37	54	55	54	57	57	53
(b) Unmetered	3	4	4	4	4	4	2	2	1	1	1
Total ..	17	17	16	33	41	58	57	56	58	58	54
4. Number of standposts	12	12*	12*	84*	87*	95*	95*	96	96	98	100
5. Expenditure in thousands—											
(a) Maintenance .. .. .. Rupees	6·41	6·08	6·89	7·08	10·03	7·92	8·93	9·23	10·19	9·94	8·65
(b) Interest and Sinking Fund .. "	7·95	7·51	7·49	26·84	19·87	12·87	12·87	12·87	12·87	12·87	12·87
Total "	14·36	13·59	14·38	33·92	29·93	20·79	21·80	22·10	23·06	22·81	21·52
6. Cost per thousand gallons maintenance .. Annas	1·55	1·48	1·68	1·03	1·46	1·15	1·30	1·34	1·48	1·45	1·26
7. Total charges per thousand gallons .. "	3·48	3·31	3·50	4·93	4·35	3·02	3·17	3·21	3·34	3·32	3·13
8. Revenue in thousands—											
(a) Unmetered .. .. .. Rupees	..	..	0·04	0·57	1·68	1·97	3·64	1·84	2·98	5·23	5·41
(b) Metered .. .. .. "	2·51	2·74	2·60	3·86	7·59	10·22	9·82	10·60	10·60	14·19	13·55
Total "	2·51	2·74	2·64	4·43	9·27	12·19	13·46	12·44	13·58	19·42	18·96
9. Receipt per thousand gallons through—											
(a) Metered supplies .. .. Annas	34·15	33·35	34·07	34·74	34·05	26·21	26·74	22·45	21·47	21·01	21·29
(b) Assesment and ferrule rating .. "	..	..	0·01	0·08	0·25	0·50	0·56	0·29	0·47	0·84	0·87
10. Profit or deficit in thousands .. Rupees	—11·85	—10·85	—11·74	—29·49	—20·66	—8·60	—8·34	—9·66	—9·48	—3·39	—2·56

*Figures supplied by the Chairman, Municipal Board.

JHANSI WATER-WORKS

Particulars		Years										
		1923-24	1924-25	1925-26	1926-27	1927-28	1928-29	1929-30	1930-31	1931-32	1932-33	1933-34
1. Quantity of water consumed—												
(a) Metered	Million gallons	2·806	3·072	2·103	3·744	3·110	3·019	3·605	3·288	3·052	3·243	3·249
(b) Unmetered	"	55·103	44·044	50·050	42·349	45·678	39·958	49·274	55·390	57·342	61·063	63·796
Total	"	57·909	47·116	52·153	46·093	48·788	42·977	52·879	58·678	60·394	64·306	67·045
2. Consumption per head per day in gallons ..		6·38	5·16	5·71	5·05	5·33	4·71	5·79	6·43	4·59	4·90	4·56
3. Number of connexions—												
(a) Metered		4	6	13	11	10	11	10	8	9	12	13
(b) Unmetered		45	45	55	45	49	59	69	81	101	125	129
Total ..		49	51	68	56	59	70	79	89	110	137	142
4. Number of standposts		19*	20*	20*	23*	22*	23*	26*	32*	40*	45*	55
5. Expenditure in thousands—												
(a) Maintenance	Rupees	15·56	22·42	22·48	18·07	13·49	19·84	19·69	15·42	14·49	17·37	21·18
(b) Interest and Sinking Fund ..	"	2·92	20·37	..	..	..	..	..	..	..	..	..
Total	"	18·48	42·79	22·48	18·07	13·49	19·84	19·69	15·42	14·49	17·37	21·18
6. Cost per thousand gallons maintenance	Annas	4·29	7·61	6·89	6·27	4·42	7·38	5·95	4·20	3·84	4·32	5·05
7. Total charge per thousand gallons ..	"	5·10	14·52	6·89	6·27	4·42	7·38	5·95	4·20	3·84	4·32	5·05
8. Revenue in thousands—												
(a) Unmetered	Rupees	7·23	8·05	11·16	13·56	13·51	14·41	14·01	14·33	16·10	19·26	22·89
(b) Metered	"	0·93	0·02	1·90	1·53	1·45	1·90	1·53	1·62	1·43	2·04	1·30
Total	"	8·16	8·07	13·06	15·08	14·96	16·31	15·54	15·95	17·53	21·30	24·19
9. Receipt per thousand gallons through—												
(a) Metered supplies	Annas	5·32	0·10	14·43	6·55	7·44	10·06	6·79	7·87	7·51	10·05	6·43
(b) Assessment and ferrule rating ..	"	2·09	2·32	3·57	5·10	4·73	5·77	4·55	4·14	4·49	5·05	5·74
10. Profit or deficit in thousands ..	Rupees	—10·32	—34·72	—9·42	—3·04	+1·47	—3·53	—4·15	+0·53	+3·04	+3·93	+3·01

* Figures for standposts supplied by the Chairman, Municipal Board.

MIRZAPUR WATER-WORKS

Particulars	Years										
	1923-24	1924-25	1925-26	1926-27	1927-28	1928-29	1929-30	1930-31	1931-32	1932-33	1933-34
1. Quantity of water consumed—											
(a) Metered .. .. Million gallons	32·840	29·877	31·987	30·182	6·742	13·623	14·275	10·868	9·972	7·668	4·389
(b) Unmetered .. .. " "	165·903	228·629	293·048	328·081	354·216	348·678	357·139	339·065	316·492	344·949	353·874
Total "	198·743	258·506	325·035	358·263	360·958	362·301	371·414	349·933	326·464	352·617	358·263
2. Consumption per head per day in gallons ..	14·13	18·44	23·18	25·56	25·68	25·85	26·50	24·97	20·89	22·62	22·98
3. Number of connexions—											
(a) Metered	295	117	121	129	206	73	77	80	38	9	9
(b) Unmetered..	1,307	1,829	1,913	2,125	2,393	2,426	2,515	2,604	2,754	2,757	2,846
Total ..	1,602	1,946	2,034	2,254	2,599	2,499	2,592	2,684	2,792	2,766	2,855
4. Number of standposts	81	92	108	153	169	214	236	238	240	261	261
5. Expenditure in thousands—											
(a) Maintenance .. .. Rupees	11·56	12·49	13·54	11·33	14·66	10·50	11·25	7·61	4·67	5·29	4·09
(b) Interest and Sinking Fund .. "	23·01	23·01	22·99	22·99	22·99	21·73	21·79	21·79	21·79	21·79	10·60
Total "	34·57	35·50	36·53	34·32	37·65	32·23	33·04	29·40	26·36	27·08	14·69
6. Cost per thousand gallons maintenance.. Annas	0·93	0·77	0·67	0·51	0·65	0·46	0·48	0·35	0·22	0·24	0·18
7. Total charges per thousand gallons .. "	2·78	2·19	1·80	1·53	1·67	1·42	1·42	1·34	1·29	1·23	0·66
8. Revenue in thousands—											
(a) Unmetered .. .. .. Rupees	12·41	13·38	21·27	21·60	23·57	35·09	26·97	26·93	29·29	30·85	29·33
(b) Metered .. .. .. "	6·49	8·56	10·87	8·08	4·23	3·43	4·46	1·33	2·60	1·76	4·44
Total "	18·90	21·94	32·14	29·68	27·80	38·52	31·43	28·26	31·89	32·61	33·77
9. Receipt per thousand gallons through—											
(a) Metered supplies .. .. Annas	3·16	4·58	5·43	4·28	10·03	4·03	4·99	1·96	4·17	3·67	16·18
(b) Assessment and ferrule rating .. "	1·19	0·93	1·16	1·05	1·06	1·61	1·21	1·28	1·48	1·43	1·33
10. Profit or deficit in thousands .. Rupees	—15·67	—13·56	—4·39	—4·64	—9·85	+6·29	—1·61	—1·14	+5·53	+5·53	+19·08

MUTTRA WATER-WORKS

Particulars	Years										
	1923–24	1924–25	1925–26	1926–27	1927–28	1928–29	1929–30	1930–31	1931–32	1932–33	1933–34
1. Quantity of water consumed—											
(a) Metered .. .. Million gallons	3·212	2·953	3·005	2·325	3·361	3·298	4·271	1·506	2·682	3·589	3·324
(b) Unmetered	333·922	336·017	392·002	271·377	289·071	274·001	237·277	243·841	249·690	274·227	244·299
Total ..	337·134	338·970	395·007	273·702	293·532	277·899	241·548	245·347	252·373	277·816	247·623
2. Consumption per head per day in gallons.. ..	21·60	21·79	25·33	17·10	18·82	17·86	15·53	15·77	11·60	12·80	11·41
3. Number of connexions—											
(a) Metered	9	11	12	9	20	26	23	18	18	48	68
(b) Unmetered	888	1,118	1,292	1,389	1,389	1,616	1,702	1,787	1,888	1,924	1,997
Total ..	897	1,129	1,304	1,398	1,409	1,642	1,725	1,805	1,906	1,972	2,065
4. Number of standposts	145	200	212	223	227	232	239	242	249	255	261
5. Expenditure in thousands—											
(a) Maintenance .. .. .. Rupees	47·06	34·60	35·07	49·37	40·22	61·40	53·82	56·35	64·06	64·44	44·19
(b) Interest and Sinking Fund .. "	10·97	10·96	10·96	10·97	10·97	10·97	18·35	18·35	18·35	18·35	18·35
Total "	58·03	45·76	46·03	60·34	51·19	72·97	72·17	74·70	82·41	82·79	62·54
6. Cost per thousand gallons maintenance .. Annas	2·23	1·64	1·42	2·89	2·19	3·54	3·57	3·67	4·06	3·71	2·85
7. Total charges per thousand gallons .. "	2·75	2·16	1·86	3·53	2·79	4·17	4·78	4·87	5·22	4·77	4·04
8. Revenue in thousands—											
(a) Unmetered .. .. .. Rupees	42·31	35·37	45·69	47·98	57·49	57·10	70·29	67·98	77·61	78·03	84·46
(b) Metered .. .. .. "	1·24	1·01	2·60	0·86	1·35	0·59	0·64	0·23	0·41	0·59	1·34
Total "	43·55	36·38	48·29	48·84	58·84	57·69	70·93	68·21	78·02	79·27	85·80
9. Receipt per thousand gallons through—											
(a) Metered supplies .. .. Annas	6·14	5·46	13·96	5·30	5·61	2·87	2·41	2·39	2·44	2·62	6·42
(b) Assessment and ferrule rating .. "	2·03	1·66	1·86	2·83	3·18	3·38	4·74	4·46	4·97	4·50	5·53
10. Profit or deficit in thousands .. .. Rupees	—14·48	—9·38	+2·26	—11·50	+7·65	—14·68	—1·24	—6·49	—4·39	—3·52	+23·36

FYZAABAD WATER-WORK

Particulars	Years										
	1923-24	1924-25	1925-26	1926-27	1927-28	1928-29	1929-30	1930-31	1931-32	1932-33	1933-34
1. Quantity of water consumed—											
(a) Metered .. .. Million gallons	..	..	1·179	5·599	8·216	9·406	9·619	10·585	10·901	12·082	12·664
(b) Unmetered .. .. .. "	..	..	67·025	122·724	145·036	131·567	139·477	150·520	172·411	201·893	184·412
Total "	..	..	68·204	128·323	153·252	140·973	149·096	161·105	183·312	213·975	197·076
2. Consumption per head per day in gallons ..	..	..	6·23	11·72	13·96	12·87	13·62	14·71	14·31	16·75	15·43
3. Number of connexions—											
(a) Metered	..	..	20	32	39	41	43	41	43	44	46
(b) Unmetered	..	..	589	756	841	921	993	1,138	1,218	1,328	1,385
Total ..	..	..	609	788	880	962	1,036	1,179	1,261	1,372	1,431
4. Number of standposts	..	..	94	95	96	102	103	107	110	111	111
5. Expenditure in thousands—											
(a) Maintenance .. .. .. Rupees	..	..	29·19	27·95	24·18	26·49	31·55	27·14	31·84	27·85	29·45
(b) Interest and Sinking Fund .. "	..	..	11·43	11·43	11·43	11·43	11·43	11·43	11·43	11·42	11·43
Total "	..	..	40·62	39·38	35·61	37·92	42·98	38·57	43·27	39·27	40·88
6. Cost per thousand gallons maintenance .. Annas	..	..	6·85	3·49	2·53	3·00	3·38	2·70	2·78	2·08	2·39
7. Total charges per thousand gallons .. "	..	..	9·53	4·91	3·72	4·30	4·61	3·83	3·78	2·94	3·32
8. Revenue in thousands—											
(a) Unmetered .. .. .. Rupees	..	..	13·14	36·58	36·82	30·44	35·80	40·59	43·61	44·45	43·64
(b) Metered .. .. .. "	..	..	0·24	1·65	5·55	8·38	2·03	1·46	1·10	1·69	1·96
Total "	..	..	13·38	38·23	42·38	38·82	37·83	42·05	44·71	46·14	45·60
9. Receipt per thousand gallons through—											
(a) Metered supplies .. .. Annas	..	..	3·31	4·71	10·81	14·26	3·38	2·20	1·61	2·24	2·47
(b) Assessment and ferrule rating .. "	..	..	3·13	4·77	4·03	3·70	4·11	4·31	4·05	3·52	3·79
10. Profit or deficit in thousands .. .. Rupees	..	..	—27·24	—1·15	+6·77	+0·90	—5·15	+3·48	+1·44	+6·87	+4·72

NOTE—This water-works started working from 1925.

HARDWAR WATER-WORKS

Particulars	Years										
	1923-24	1924-25	1925-26	1926-27	1927-28	1928-29	1929-30	1930-31	1931-32	1932-33	1933-34
1. Quantity of water consumed—											
(a) Metered .. .. Million gallons	..	..	..	0·035	1·045	1·785	2·610	3·048	2·439	1·867	2·588
(b) Unmetered .. .. "	..	..	..	6·202	32·776	44·333	84·988	83·538	78·199	84·015	91·659
Total "	..	..	..	6·237	33·821	46·173	87·598	86·586	80·638	85·882	94·247
2. Consumption per head per day in gallons ..	..	..	..	..	10·24	14·02	26·59	26·29	19·10	20·40	22·38
3. Number of connexions—											
(a) Metered	..	..	..	1	4	13	13	13	14	22	24
(b) Unmetered	..	..	..	25	96	135	179	185	196	219	230
Total ..	..	..	..	26	100	148	192	198	210	241	254
4. Number of standposts	..	..	..	37‡	36‡	40‡	44‡	47‡	48‡	96*‡	104
5. Expenditure in thousands—											
(a) Maintenance .. .. .. Rupees	..	..	..	5·84	18·58	20·84	25·78	27·02	21·30	22·59	30·12
(b) Interest and Sinking Fund .. "	..	..	..	11·42	11·42	11·42	11·42	11·42	11·42	11·42	11·43
Total "	..	..	..	17·26	30·00	32·26	37·20	38·44	32·81	33·95	41·55
6. Cost per thousand gallons maintenance .. Annas	..	..	..	14·85	8·79	7·22	4·71	4·99	4·24	4·20	5·11
7. Total charges per thousand gallons .. "	..	..	..	48·92	14·19	11·18	6·79	7·10	6·51	6·33	7·05
8. Revenue in thousands—											
(a) Unmetered .. .. .. Rupees	..	..	..	..	2·37§	46·58	59·60	56·39	50·41	52·25	48·24
(b) Metered .. .. .. "	..	..	..	..	0·61	0·86	1·74	2·02	2·00	1·54	2·14
Total "	..	..	..	..	2·98	47·44	61·34	58·41	52·41	53·79	50·38
9. Receipt per thousand gallons through—											
(a) Metered supplies .. .. Annas	..	..	..	..	9·38	7·79	10·65	10·60	13·13	13·20	13·21
(b) Assessment and ferrule rating .. "	..	..	..	..	1·16	16·79	11·22	10·30	10·31	9·95	8·72
10. Profit or deficit in thousands .. .. Rupees	..	..	..	..	—27·02	+15·18	+24·14	+19·97	+19·60	+19·34	+9·33

§ Does not include Rs.50,000 receipt from Fair Fund.
‡ Figure for standpost supplied by the Electrical and Water-Works Engineer.
* Increase is due to Adh-Kumbh Mela this year.
NOTE—This water-works started working from 1926.

UNAO WATER-WORKS

Particulars		Years										
		1923-24	1924-25	1925-26	1926-27	1927-28	1928-29	1929-30	1930-31	1931-32	1932-33	1933-34
1. Quantity of water consumed—												
(a) Metered	Million gallons	..	..	..	..	..	0·089	0·500	1·037	0·700	0·918	1·639
(b) Unmetered	"	..	..	..	..	13·732	34·836	40·657	54·343	49·992	56·636	56·195
Total	"	..	..	..	..	13·732	34·925	41·217	55·380	50·692	57·549	57·834
2. Consumption per head per day in gallons ..		..	..	..	..	5·87	10·63	12·55	16·86	10·65	12·13	12·19
3. Number of connexions—												
(a) Metered		..	..	..	..	..	1	2	2	2	10	31
(b) Unmetered		..	..	..	..	94	161	161	161	208	216	214
Total ..		..	..	..	..	94	162	163	163	210	226	245
4. Number of standposts		..	..	..	..	46	49	50	51	51	60	65
5. Expenditure in thousands—												
(a) Maintenance	Rupees	..	..	..	..	4·51	6·90	7·39	8·36	7·18	10·16	10·45
(b) Interest and Sinking Fund ..	"	..	..	..	..	..	..	..	..	..	..	1·41
Total	"	..	..	..	..	4·51	6·90	7·39	8·36	7·18	10·16	11·86
6. Cost per thousand gallons maintenance ..	Annas	..	..	..	..	5·26	3·16	2·87	2·41	2·27	2·82	2·89
7. Total charges per thousand gallons ..	"	..	..	..	..	5·26	3·16	2·87	2·41	2·27	2·82	3·28
8. Revenue in thousands—												
(a) Unmetered	Rupees	..	..	..	..	1·52	7·40	8·19	6·70	6·97	10·31	8·93
(b) Metered	"	..	..	..	..	..	0·17	0·23	0·57	0·68	0·75	1·24
Total	"	..	..	..	..	1·52	7·57	8·42	7·27	7·65	11·06	10·17
9. Receipt per thousand gallons through—												
(a) Metered supplies	Annas	..	..	..	..	..	29·52	6·68	8·76	15·50	13·23	12·09
(b) Assessment and ferrule rating ..	"	..	..	..	..	1·77	3·40	3·22	1·97	2·23	2·91	2·54
10. Profit or deficit in thousands ..	Rupees	..	..	..	..	−2·99	+0·67	+1·03	−1·09	+0·47	+0·90	−1·69

NOTE—This water-works started working from 1927.

KOSI WATER-WORKS

Particulars	Years										
	1923-24	1924-25	1925-26	1926-27	1927-28	1928-29	1929-30	1930-31	1931-32	1932-33	1933-34
1. Quantity of water consumed—											
(a) Metered .. .. Million gallons	..	..	..	..	..	..	..	0·473	0·698	0·748	1·170
(b) Unmetered .. .. .. "	..	..	..	..	..	..	..	14·755	17·983	23·198	21·589
Total "	..	..	..	..	..	..	..	15·228	18·681	23·946	22·759
2. Consumption per head per day in gallons ..	..	..	..	..	..	..	..	6·18	7·00	8·99	8·55
3. Number of connexions—											
(a) Metered	..	..	..	..	..	..	..	4	11	14	31
(b) Unmetered	..	..	..	..	..	..	..	2	2	5	4
Total ..	..	..	..	..	..	..	..	6	13	19	35
4. Number of standposts	..	..	..	..	..	..	..	29	23	27	37
5. Expenditure in thousands—											
(a) Maintenance .. .. .. Rupees	..	..	..	..	..	..	..	6·37	4·84	5·16	6·62
(b) Interest and Sinking Fund .. "	..	..	..	..	..	..	..	..	..	..	..
Total "	..	..	..	..	..	..	..	6·37	4·84	5·16	6·62
6. Cost per thousand gallons maintenance .. Annas	..	..	..	..	..	..	..	6·69	4·14	3·44	4·65
7. Total charges per thousand gallons .. "	..	..	..	..	..	..	..	6·69	4·14	3·44	4·65
8. Revenue in thousands—											
(a) Unmetered .. .. .. Rupees	..	..	..	..	..	..	...	8·79	8·28	7·73	7·76
(b) Metered .. .. .. "	..	..	..	..	..	..	..	0·28	0·14	0·12	0·21
Total "	..	..	..	..	..	..	..	9·07	8·42	7·85	7·97
9. Receipt per thousand gallons through—											
(a) Metered supplies .. .. Annas	..	..	..	..	..	..	..	9·54	3·16	2·65	2·82
(b) Assessment and ferrule rating .. "	..	..	..	..	..	..	..	9·53	7·37	5·33	5·75
10. Profit or deficit in thousands .. Rupees	..	..	..	..	..	..	..	+2·70	+3·58	+2·69	+1·35

NOTE—This water-works started working from 1929.

FATEHPUR-SIKRI WATER-WORKS

Particulars	Years										
	1923-24	1924-25	1925-26	1926-27	1927-28	1928-29	1929-30	1930-31	1931-32	1932-33	1933-34
1. Quantity of water consumed—											
(a) Metered .. .. Million gallons	..	..	..	..	..	..	..	..	..	..	0·022
(b) Unmetered .. .. "	..	..	..	..	..	..	..	10·713	12·606	14·857	14·561
Total "	..	..	..	..	..	..	..	10·713	12·606	14·857	14·583
2. Consumption per head per day in gallons ..	..	..	..	..	..	..	..	6·67	5·60	6·62	6·49
3. Number of connexions—											
(a) Metered	..	..	..	..	..	..	..	..	..	..	2
(b) Unmetered	..	..	..	..	..	..	..	..	..	..	..
Total ..	..	..	..	..	..	..	..	..	..	..	2
4. Number of standposts	..	..	..	..	..	..	..	21	*26	35	36
5. Expenditure in thousands—											
(a) Maintenance .. .. .. Rupees	..	..	..	..	..	..	..	3·16	3·15	3·86	3·56
(b) Interest and Sinking Fund .. "	..	..	..	..	..	..	..	..	...	..	..
Total "	..	..	..	..	..	..	..	3·16	3·15	3·86	3·56
6. Cost per thousand gallons maintenance.. Annas	..	..	..	..	..	..	..	4·72	4·00	4·16	3·90
7. Total charges per thousand gallons .. "	..	..	..	..	..	..	..	4·72	4·00	4·16	3·90
8. Revenue in thousands—											
(a) Unmetered .. .. .. Rupees	..	..	..	..	..	..	..	..	1·91	1·02	1·24
(b) Metered .. .. .. "	..	..	..	..	..	..	..	..	..	..	..
Total "	..	..	..	..	..	..	..	..	1·91	1·02	1·24
9. Receipt per thousand gallons through—											
(a) Metered supplies .. .. Annas	..	..	..	..	..	..	..	..	..	..	..
(b) Assessment and ferrule rating .. "	..	..	..	..	..	..	..	..	2·43	1·10	1·36
10. Profit or deficit in thousands .. Rupees	..	..	..	..	..	..	..	—3·16	—1·24	—2·84	—2·32

*Includes four tanks for Mela water supply.

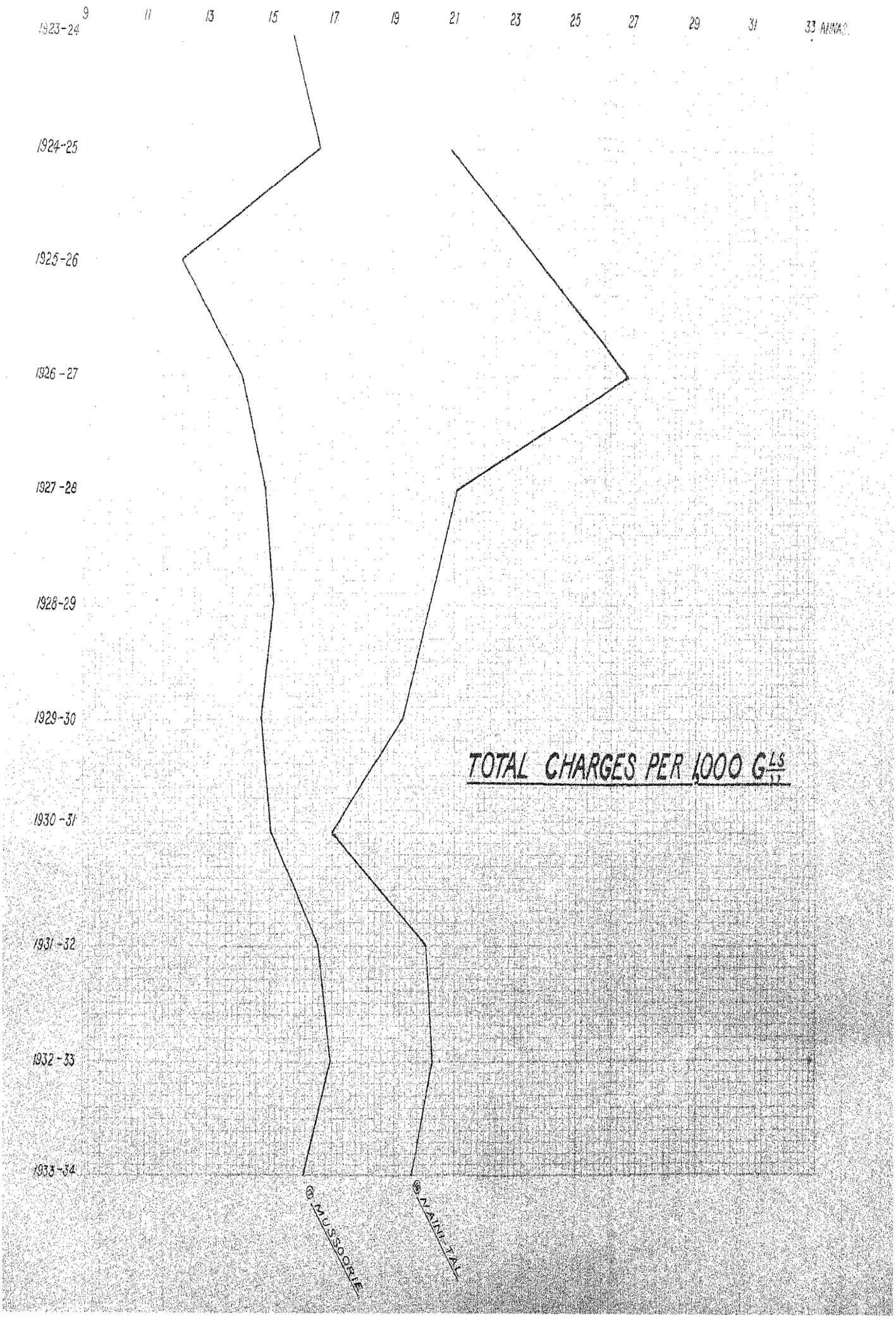
NOTE—This water-works started working from 1930.

ALIGARH WATER-WORKS

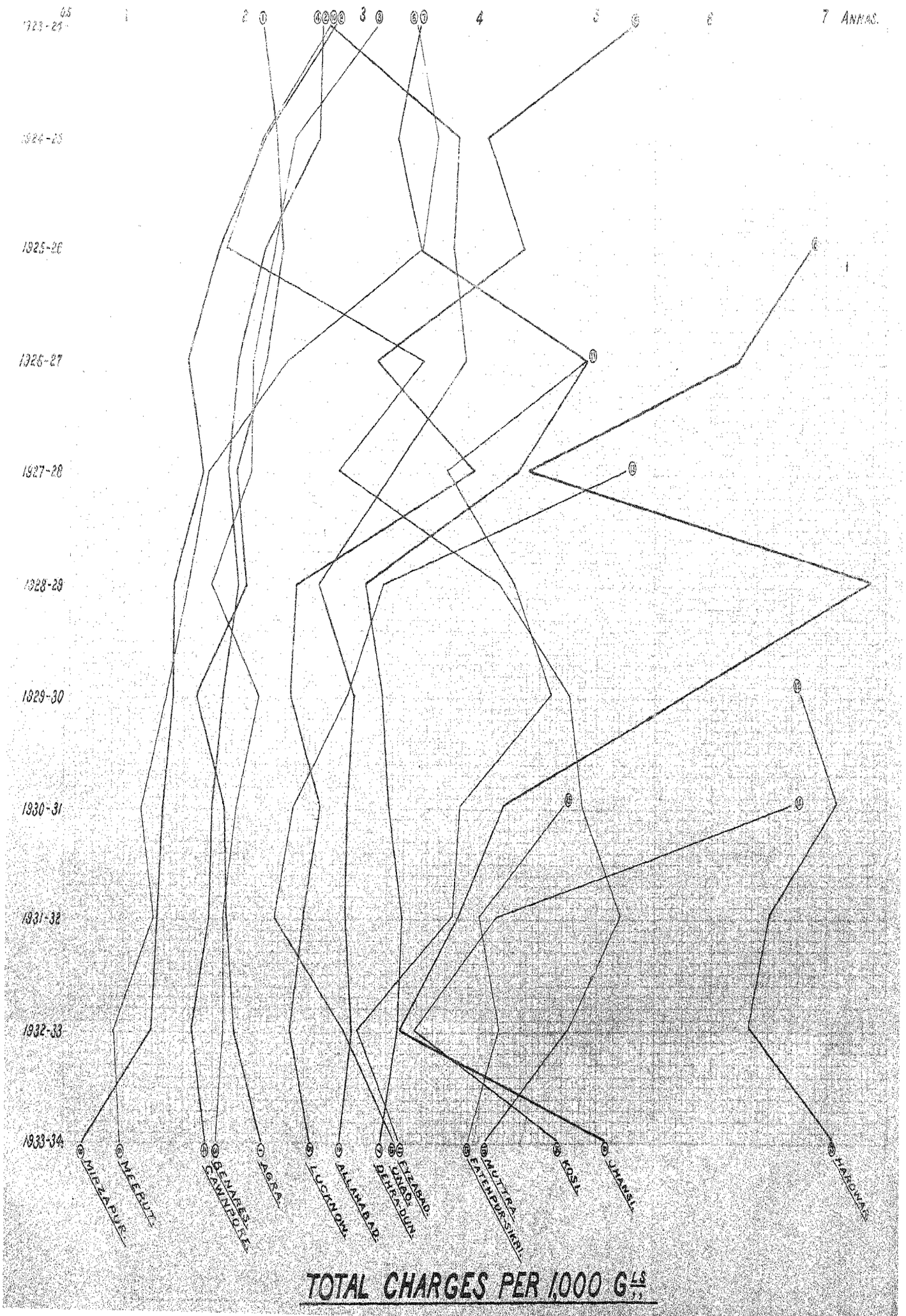
Particulars	Years										
	1923-24	1924-25	1925-26	1926-27	1927-28	1928-29	1929-30	1930-31	1931-32	1932-33	1933 34
1. Quantity of water consumed—											
(a) Metered .. .. Million gallons.	..	..	..	..	..	..	..	..	..	..	..
(b) Unmetered .. .. .. "	..	..	..	..	..	..	..	16·320	65·797	111·253	100·319
Total "	..	..	..	..	..	..	..	16·320	65·797	111·253	100·319
2. Consumption per head per day in gallons ..	..	..	..	..	..	..	..	1·90	5·14	8·71	7·85
3. Number of connexions—											
(a) Metered	..	..	..	..	..	..	..	..	..	..	..
(b) Unmetered	..	..	..	..	..	..	..	..	394	657	673
Total ..	..	..	..	..	..	..	..	..	394	657	673
4. Number of standposts	..	..	..	..	..	..	..	101	102	103	103
5. Expenditure in thousands—											
(a) Maintenance .. .. .. Rupees	..	..	..	..	..	..	..	5·33	17·97	29·07	26·96
(b) Interest and Sinking Fund .. "	..	..	..	..	..	..	..	22·63	38·28	38·28	38·28
Total "	..	..	..	..	..	..	..	27·96	56·25	67·35	65·24
6. Cost per thousand gallons maintenance.. Annas	..	..	..	..	..	..	..	5·22	4·37	4·18	4·50
7. Total charges per thousand gallons .. "	..	..	..	..	..	..	..	27·41	13·68	9·69	10·40
8. Revenue in thousands—											
(a) Unmetered .. .. .. Rupees	..	..	..	..	..	..	..	..	5·33	14·26	15·78
(b) Metered .. .. .. "	..	..	..	..	..	..	..	..	..	..	..
Total "	..	..	..	..	..	..	..	..	5·33	14·26	15·78
9. Receipt per thousand gallons through—											
(a) Metered supplies .. .. Annas	..	..	..	..	..	..	..	..	..	..	..
(b) Assessment and ferrule rating .. "	..	..	..	..	..	..	..	..	1·30	2·05	2·52
10. Profit or deficit in thousands.. .. Rupees	..	..	..	..	..	..	..	—27·96	—50·92	—53·09	—49·46

NOTE—This water-works started working from 1930.

COST OF WATER



COST OF WATER



TOTAL CHARGES PER 1,000 G^{LS}

THIRTY-EIGHTH ANNUAL REPORT

OF THE

SUPERINTENDING ENGINEER

PUBLIC HEALTH DEPARTMENT
UNITED PROVINCES

FOR THE YEAR ENDED MARCH 31, 1933.

ALLAHABAD
SUPERINTENDENT, PRINTING AND STATIONERY, UNITED PROVINCES
1933

Thirty-eighth Annual Report of the Superintending Engineer, Public Health Department, United Provinces, for the year ended March 31, 1933.

DUTIES which have been undertaken by this department during the year are indicated in the attached table :—

Item no.	Nature of works	Amount involved in lakhs of rupees	Remarks
1	Duties under the Local Authorities Loans Act, 1914, and the Municipalities Act, 1916, i.e., the supervision and inspection of all open water-works and drainage pumping stations.	65·02	This amount represents the turn-over in revenue and expenditure on water supply, drainage and electric supply and is made up as follows :—
2	Local works—		
	(a) Preparation of projects ..	17·64	21 detailed proposals.
	(b) Construction	2·99	Payments made.
3	Provincial works—		
	(a) Preparation of projects ..	0·34	17 detailed projects.
	(b) Construction	0·37	Payments made.
	(c) Maintenance	0·09	Lucknow, Gumti Weir, anti-malaria works and Allahabad, Magh Mela maintenance.
4	(a) Advice free to local authorities ..	10·50	21 forecasts of cost with reports supplied free.
	(b) Advice free to provincial works ..	0·40	4 forecasts of cost with reports supplied free.
5	Board of Public Health business—		
	(a) Examination of projects for urban works.	7·73	3 projects were scrutinized.
	(b) Examination of projects for rural sanitation.	4·25	974 projects were scrutinized.
	(c) Checking progress on urban and rural areas works G. O's nos. 463/XI, dated the 6th February, 1931, 470/XI, dated the 6th February, 1931, 530/XI, dated the 11th February, 1931 and 490/XI, dated the 9th April, 1931.	9·16	Progress reports collected and consolidated for the Board of Public Health.
6	Examination of projects for provincial works.	0·01	One project examined.
7	Inspection and reports on works carried out by local bodies.	2·00	
8	Scrutiny of certain Municipal Budgets, G. O. no. 4718/XI—10-H., dated the 6th January, 1933.	..	Under head of revenue and expenditure: Public works, electric supply, drainage, conservancy and sewage disposal, public lighting. (Up to date only 56 local authorities have reported their budget figures. In future reports greater details will be recorded.)

	Revenue	Expenditure	Total
	Rs.	Rs.	Rs.
Water-works.	29,05,405	23,23,611	51,29,106
Drainage.	33,809	75,072	1,13,881
Electric supply.	6,64,912	5,94,539	12,59,451
GRAND TOTAL.	36,03,216	28,93,222	65,02,438

The total value of projects including preliminary proposals and forecasts of cost which have been prepared during the year under report is Rs.29·38 lakhs, while construction carried out amounts in value to Rs.3·36 lakhs.

Fees.

Of the seven items given in above table, fees are recoverable only on item 2. During the year an amount of Rs.31,434 was earned as fees on project work against an amount of Rs.17,417 realized. Including the arrears of the previous year a sum of Rs.21,415 was realized as fees for the preparation of projects. Earnings for construction carried out by this department amounted to Rs.36,482. Thus for local works a total sum of Rs 67,897 was realized against Rs.41,800 anticipated as recoveries in the sanctioned budget.

Effect of prevailing conditions on local budgets.

The administration reports of the twenty-eight municipalities received in this office show that these bodies have incurred a total expenditure of nearly one and a quarter crores of rupees, of which nearly rupees 70 lakhs constitute expenditure on public works. The expenditure on water-works in those municipalities where water-works function amounted to over twenty-five lakhs during the year. This figure when compared with previous years indicates that municipal boards at least have not been hit so hard by financial depression as might have been expected.

Present stage of development.

The annual returns of local authorities show that a total urban population of 1·49 millions is regularly supplied with pure water, the total daily supply averaging 41 million gallons. In addition to this a temporary population of 3·94 millions consisting mainly of pilgrims attending *melas* was served with a pure water supply estimated to amount to three gallons per head per day.

Units aggregating about 6,200 water horse-power have now been brought into regular operation in the process of public water supplies in these provinces.

Retrenchment.

This department has been subject to severe retrenchment during the year and extensive reductions were found possible sooner than in other departments, as the custom has been to employ temporary, in preference to permanent staff.

Recommendations for further reduction of a certain number of the superior engineering establishment have been made.

Favourable centage charges of establishment cost to works cost have been maintained. These results are mainly due to the introduction of a superior system of carrying out works which has been found possible with the assistance of the specialist officers, but it is also in no small part due to the skill of staff, mainly recruited on a temporary basis, the fittest of which only survive.

The Water-Works Engineer and Mechanical Adviser to Government proceeded on leave preparatory to retirement from May, 1932, in the meantime the Superintending Engineer endeavours to undertake the more important duties of the post in addition to his own work.

In addition to this one further post of assistant engineer was retrenched during this year.

In pursuit of economy it has been decided that project work, for which funds cannot definitely be promised by the local authorities concerned, should not be taken up and that only those urgent works, for which funds exist, should receive attention.

Budgets of local authorities.

The budget forms of local authorities have recently been revised under Government orders; the object of this change is to facilitate the examination of the proposals and compare the operations of the different authorities. It is hoped that this alteration will also result in better methods and greater accuracy in budgeting, reduce the tendency for certain works to be starved as regards maintenance and curb unjustifiable expenditure in other cases.

Some glaring instances of delay in the preparation of their budget proposals by local authorities were brought to the notice of Government. The Allahabad, Lucknow, Meerut, Muttra, Fyzabad, Moradabad, Kosi and Fatehpur-Sikri Boards delayed unduly to prepare their revised budgets and of these, Lucknow, Meerut and Moradabad failed entirely to prepare their revised budgets until the financial year closed. The Mirzapur Municipal Board was unable to prepare a proper budget or reply to questions concerning their outlay on water-works.

Administration of their public works by local authorities.

Special attention was devoted to rendering more effective G. O. no. 1015/XI—91-129, dated the 3rd April, 1930, concerning the method of carrying out public works and advice was freely given whenever asked for by the local authorities. Several instances have been noticed where losses are distinctly traceable to non-compliance with this Government order.

The letting of contracts to tenderers whose offer is lowest appears to be an obsession in many quarters and the fact that experience and skill on the part of contractors is essential, if successful work is to be accomplished, does not receive the recognition it is due. Heavy losses have resulted from the blind letting of contracts

to the lowest bid and if such a procedure is persisted in, it must ultimately result in discrediting the system of calling for tenders.

As time proceeds local authorities in many cases become bolder in their neglect of rules of procedure and in their irregularities and delay. Some have undoubtedly gained the impression that obliviscence on the part of higher authority betokens tacit approval. Mere supersession seems to be an inadequate means of dealing with such bodies. The onus of cleansing an Augean stable and the odium attaching to the steps necessary falls on other shoulders than those concerned. A more effective method perhaps would be to hold the erring board responsible in person and in pocket for loss of taxpayers' money.

Water Supply—General

Statements have been included in this report showing the rate of increase of demand for water in the more important supplies and information is also included in these statements, from which the relative increase in the number of metered, unmetered connexions and standposts may be judged; the expenditure on maintenance and interest and sinking fund, the cost of water per thousand gallons and the profits which the various authorities make on their water supply, are also shown. The period comprised is from the financial year 1922-23 till 1932-33, inclusive.

The most striking feature concerning municipal enterprise in water supply is the colossal losses which the taxpayer suffers with apparent complacency. Perhaps if he were capable of realizing the amount lost annually he would not remain silent. The extent of the losses is only equalled by the impotence of authority to check or curb them.

Unyielding opposition is encountered in controlling distribution and in applying meters. Interest as regards the accuracy of records of quantity supplied and costs is absent. The difficulty of obtaining and holding in employment proper staff and the tendency to starve the supplies as far as replacements and repairs are concerned, is remarkable.

During the year detailed specifications, tender forms and general information concerning meters were prepared, printed and circulated to all local authorities in the hope that use would be made of this work.

Investigations in some municipalities show that the scale of ferrule rating in vogue is very unfair where pressures are low and this discloses the necessity for adjustments to the scale generally used.

A comparison of the revenue derived through meters with that derived from water-rate assessment indicates that the margin between the authorized charges for water through meters and the cost of water is too great. This margin is taken advantage of by several local authorities to penalize metered consumers, whilst providing water at less than cost price under assessment ratings.

The use of inferior piping material for making private connexions is universal and a great deal of waste is traceable to this shortsighted policy. The provision of large numbers of standposts, to placate or to influence voters, is a course frequently adopted by candidates for election.

The areas, where shortage in supply in many plains municipalities is prevalent, show a tendency to rapid increase and the time is at hand when some boards may find themselves in a serious position as regards their responsibilities under the Act.

With the progress of time and the increase in demand, it is becoming clear that many of the water supply systems have become far too large and important to be managed by local authorities. The recognition of this has resulted in proposed alterations in the Municipalities Act whereby local authorities, where they so desire, may transfer their duties under the Act to private utility companies with the consent of Government.

Drainage—General

The vast improvements which drainage works cause have even been favourably commented on by the local authorities themselves and in all instances where proper drainage works have been completed, the betterment in the adjacent properties has been marked. In one instance, a scheme which cost several lakhs of rupees has resulted in an even greater increase in the total value of the contiguous buildings and plots.

In some works the benefit is slowly negatived by the failure of the local authorities to insist on property owners making arrangements for connecting the foul water from their premises to the drain. The local authorities in such cases cite as an insuperable obstacle to bringing their by-laws into action, the poverty of the owners. The betterment in the value of the property, however, refutes such an argument and the real reasons seem to be that the value of the drainage works is either not sufficiently realized to induce the boards to preserve it or that other influences are at work which the board are unable to control.

The lack of skill on the part of some municipal staff is a great drawback in some cases. This is often evident in the manner in which drainage extensions are carried out and it is not an infrequent occurrence for house connexions to be made untrapped to foul water sewers and storm water gullies also to be so connected to foul water sewers designed on the separate system.

OPERATIONS OF LOCAL AUTHORITIES AND OTHER WORKS

AGRA.

Distress due to a grevious shortage in supply over the greater part of Agra steadily increases. The treatment of this important defect centres on the prevention of waste in the low zone of supply. An attempt was made by the board in June, 1932, to isolate the high and low zones of supply, but the consumers in the low zone, who enjoy an abundant supply of water, protested so strongly when the pressure was reduced that the process had to be suspended.

The only remedy now is the introduction of a rigid system of metering, particularly in the lowlying areas where the pressure is great and waste most scandalous.

At the request of the board a project for metering was prepared but the board would resort to any measure rather than proceed with such proposals and keep postponing the matter for reasons which they do not record.

During the very dry months the flow in the Jumna tends to lessen progressively as years pass and sufficient water is often not available for the needs of the town. At such times water is supplied from Kitham Reservoir, which is under the control of the Irrigation Department and which was constructed for the purpose of relieving such emergencies.

May and June, 1932, were very dry months and the monsoon was late. There was consequently an intense demand for irrigation water and the Jumna stream completely dried up. Arrangements were therefore made for a supply of water from Kitham Reservoir, but the water which reached the water-works was very foul and subjected the filtration plant at Agra to the severest test. During this state of affairs a local shower sufficed to make the tributary *nalas* discharge their dry weather offal and debris into the meagre stream from Kitham and the resulting flow assumed the quality of concentrated sewage of a viscid nature. It also happened that this liquid appeared at the water-works intake at night and was not detected by the staff till the settling tanks and filters had been charged and the filtration system had broken down. The colour, taste and smell of the filtrate was immediately noticed and strong protests were made by the military authorities and the towns people.

The position was so serious that the Executive Engineer, I Division, had to remain in Agra for many days, and the Superintending Engineer together with the Director of Public Health made a special visit to investigate and report to Government upon the causes of pollution and the steps necessary to prevent a recurrence.

Several weeks elapsed before the rapid and slow sand filter plant could be reinstated and arrangements made for the installation of chlorinating apparatus so that the water from the slow sand filters could be thoroughly chlorinated.

The danger of a recurrence and the necessity of preserving some continuous dry weather flow in the Jumna bed was pointed out in Superintending Engineer's report on this case. Such a course would adversely affect the available irrigation supply in dry years.

The board made much delay in providing spare parts for the water-works machinery and in spite of several warnings and requisitions the spare parts have not been provided.

Thirty-five per cent. arrears of revenue remain uncollected.

Water supply improvements—The new Paterson filtration plant which was completed in 1930 continued to operate satisfactorily and the two vertical spindle motor-driven raw water pumps which were installed at the same time also gave satisfaction.

After much delay the board has permitted the increments due to some members of the water-works staff.

The net profit on the year's working amounted to Rs.81,867.

Cantonment water supply—(Boosting pumps, Rs.25,307).—A forecast of cost for this work was submitted last year.

A fair estimate has been furnished the board this year who approved of it.

Contract documents have been prepared for the pumping plant and the necessary buildings and the work will be started as soon as the municipal board provide the necessary funds.

Metering connexions in the low zone, Rs.48,000—As already mentioned a project has been prepared, which provides meters for all connexions of half an inch and over in the low zones of Agra water supply, where the pressure is high and the supply

more or less continuous, and allows for proper organization and supervision until control is gained.

AGRA—(concld.).

Though the project was put before the board on 21st January, 1933, so far nothing has materialized.

As mentioned in the report of the project the proposal to meter connexions is likely to be unpopular specially with those consumers who have been accustomed to get an abundant supply of water at high pressure. It remains to be seen whether these few but influential persons will be able to force the board to supply them with a copious supply of water at low rates to the great disadvantage and distress of the majority.

Drainage—No new development has taken place with regard to Agra drainage except that with a view to utilizing the savings from the water supply extensions work, the board have recently requested a forecast of cost of a useful instalment of drainage to do away with the sewage nuisance at Strand Road and the Fort. Government has decided however that any balance of funds left as savings from the water supply extension must be refunded and that for a first instalment of their drainage which will cost about two lakhs the board should come to a decision as regards its urgency and then find ways and means of financing the work.

Dayalbagh drainage—Dayalbagh is a colony in the vicinity of Agra belonging to a religious and philanthropic society known as the Radha Swami Institute and these authorities desire a drainage scheme on modern lines for the colony.

A forecast of cost amounting to Rs.1,55,400 was prepared in the first instance, now a fair estimate is being prepared for the work and a sum of Rs. 2,000 has been provided by Government towards payment of fees for preparation of the estimate.

ALIGARH.

Water-works maintenance—As recorded last year the suction arms of the bore hole pumps were extended in wells nos. 2, 3 and 4 with the result that the supply had been considerably increased.

Well no. 1 was not dealt with as it was suspected that the strainer had given way. The Water-Works Superintendent however lengthened the suction of this well no. 1, but after a short period of working, suspicions proved to be true and this well had to all intents and purposes failed owing to sand blow and subsidence.

It is reported that although water mains were laid in the Civil Lines at Aligarh, so far the board have never supplied water to this area. Connexions are however being given liberally in the city, which have practically absorbed the full capacity of the wells.

Owing to the failure of well no. 1 and the large number of connexions permitted, more tube-wells are urgently necessary.

All the four vertical bore hole pumping sets supplying the low zone and the two high zone centrifugal sets worked satisfactorily throughout the year with the exception of sets nos. 1 and 3 of the low zone. Slight vibrations have been experienced in both these sets and no. 3 was completely overhauled.

Set no. 2 requires a lignum-vitae bush, but this spare part the board have not taken steps to procure.

The workshop which was constructed and equipped and handed over to the board with the system in November, 1930, has never been used. The motor and the machines have lain idle since the date they were handed over. This is due to the board's omission to provide staff. Thus they have failed to put in hand running repairs necessary to the distribution fittings and the pumping plant.

There is no staff for inspecting the distribution for controlling the numerous connexions which are made to the distribution mains.

A project for additional tube-wells and pumping plant was furnished the board in February, 1932, but so far no steps have been taken to put the work in hand.

On several occasions the unsatisfactory state of the water-works compound has been noticed; too many people reside in the water-works compound, and it is doubtful whether they are all municipal employees. Refuse is not cleared away and as a site for wells for a public water supply, the compound is highly unsatisfactory.

This board derived no revenue for metered supplies, but 2·05 annas per 1,000 gallons from assessments, whilst the cost of water amounted to 9·69 annas per 1,000 gallons.

The water-works system is starved of funds for repairs and maintenance, adequate staff is not employed. There is no water-tax. The board remain heedless of advice offered them.

ALLAHABAD.

Water supply maintenance—Very few repairs were found necessary during the year, the pumping plant remaining in a satisfactory condition. The impellers of the clear water centrifugal pumps have been renewed as recommended, for they had become deeply pitted. At Khusrubagh the steam plant is still maintained as a

ALLAHABAD—(*concld.*).

stand-by; but at Karelabagh the steam pumps and buildings have been dismantled and are to be auctioned shortly.

The filtration rate of the slow sand filters was much under normal during the year, but it is now reported that the filters have been cleaned and that the sand has been brought up to the proper depth. The chloronomes have been overhauled and certain parts renewed. The weir recorder, the readings of which were fast, has now been corrected by the manufacturer's representative.

The shortage in certain areas is marked as the control of the distribution has been entirely lost; during the year 315 new connexions and 22 new standposts were added nevertheless. (The consumption of water increased from the year 1923 to the year 1931 from 21·85 to 38·60 gallons per head per day, but fell to 30·82 in the year under review.)

The annual maintenance charges including interest and sinking fund amounted to Rs.3,76,368. An income of Rs.5,06,996 was obtained which resulted in a net profit of Rs.1,30,678 on the year's working.

Water supply extension—(two tube-wells in Civil Lines)—These wells, required to augment the water supply in Civil Lines, form part of the reorganization project. An amount of Rs.12,000 was granted by the Board of Public Health in March, 1930, and Government sanctioned a loan of Rs.30,153 in November, 1930, but the municipal board could not deposit the full amount of funds until October, 1932. The work will be started shortly.

Allahabad metering and waste prevention.—At the request of the board, the Executive Engineer made a thorough investigation of the distribution at Allahabad and in the process of preparing proposals for regaining control, this officer discovered several interesting and important facts. The most important is the unsuitability of the scale of ferrule rating where pressures are low. By the use of break pressure tanks it has been found possible to retail water based accurately on the water-tax paid. The board are at present considering the Executive Engineer's proposals.

The work on the tube-well in Alfred Park intended to replace the existing inadequate and expensive supply from the riverside pumping station could not be started as funds are not available.

Magh Mela water supply—The oil engine driven air-lift-*cum*-centrifugal pumping plant in charge of Well-boring Operations division, was thoroughly overhauled and a satisfactory supply to the *mela* was maintained.

The work of laying distribution mains and fittings was completed in time. This work forms part of a contract running for a period of years.

Proposals for installing an electrically-driven pumping plant, estimated to cost Rs.30,542 were prepared for the new tube-well, including the pump house, increasing the size of the elevated reservoir and certain other improvements and additions.

ALMORA.

Water supply (Rs.1·75 lakhs)—This work was commenced three years ago and was completed in 1931. The work was not taken over by the board until the 26th April, 1932. This delay was a result of a dispute concerning the quality of the work. The Almora water supply is derived from a number of small springs in the Siahi ka Devi mountain. These springs have to be connected to a common collecting chamber and led down into the Kosi valley through a difference in elevation of over 2,329 feet. Here a foot bridge had to be constructed across the Kosi and the leading main carried over this bridge and up the Almora hillside through a height of 2,200 feet. The length of the leading main was seven miles and the designed capacity was 32 gallons per minute. A reinforced concrete reservoir at Almora also formed part of this work. The greater part of the leading main had to be designed to withstand a working pressure of 2,200 feet.

The scheme was originated by the board itself and was carried out by this department on their behalf since they could neither carry it out themselves nor obtain the services of qualified staff for that purpose. The available supply from springs was checked by three independent authorities before the proposals were technically sanctioned, but only three years' records existed on which the proposal could be based. In order that the supply should be assured against shortage, a second system of springs was included in the original proposal, but this extra work was not found possible as funds were not forthcoming.

Keen tendering took place, but the board were evidently disappointed that the work was not given to some local contractor but awarded to a plains contractor whose tender was lowest. Local hostility caused delay and no little trouble during construction and in addition the previous year's drought affected the yield of the springs so much that at one period in the hot weather, the supply from the group had dwindled to 15 gallons per minute, whilst the pipeline had been yielding over 80 gallons per minute during the preceding cold weather. This shortage was seized upon by interested persons as grounds for challenging the quality of the work and special inspections had to be carried out. The result of these inspections

disclosed the fact that excellent work had been carried out and that the board had indeed received full measure in return for the expenditure incurred. ALMORA (*contd.*).

A forecast of cost was subsequently furnished to the board amounting to Rs.0·22 lakh at their own request for extending the headworks to intercept the additional group of springs referred to above.

Water supply maintenance—In spite of several reminders, the local authority has not submitted the figures concerning the working of this undertaking, no figures are, therefore, available for comparison in the appendices.

Anti-malarial works—Completion of an outfall (Rs. 0·18 lakh)—The works included the completion of the outfall drain of the above drainage works built a few years ago and the construction of a concrete road. The works have been completed and are now under maintenance. Funds were found for this work in shares by the Board of Public Health and the East Indian Railway authorities. BAREILLY.

Water supply maintenance—At both the Bhelupura and Bhadaini stations, the new plant gave complete satisfaction. At the unfiltered station Bhadaini, it is reported that over 300,000 cubic feet of silt is pumped along with the crude water during the three rainy months. In spite of this heavy sediment the impellers have lasted for three complete seasons without refitting. BENARES.

The old steam plant was maintained as stand-by during the year. One tube-well installation has been converted from air-lift to a motor-driven centrifugal pump and the second well is in process of similar change.

Negotiations have been undertaken with the object of reducing the bulk rates for an increased electric supply. It is understood that these negotiations have been completed to the satisfaction of the board.

The incessant complaints from the high zone were met by giving an alternate supply to the two zones, but this arrangement is inherently unsatisfactory. The Benares distribution is perhaps the most wasteful one in the Province. The supply has now reached the figure of over 37 gallons per head per day though there is little industrial demand. The number of private connexions and public standposts increases by an unjustifiable rate and the board obstinately refuse to permit the purchase of meters. The number of private unmetered connexions is 50 per cent. more than at Cawnpore and 40 per cent. more than at Lucknow and the extent of the waste can be easily judged from the number of wasting connexions visible in the town.

The workshops were put to considerable use both for municipal and for outside work and they earn an appreciable revenue for the board.

After a period of twelve years' continuous working settling tank no. 3 has at last been dewatered and silt-cleaning operations are in hand. The silt is now being used systematically for widening the embankments of the settling tanks and silt is also sold to contractors for brick-making purposes. During the year over two million bricks were manufactured from this silt. The recording weir chamber on the inlet to the settling tanks is being replaced by means of a steel tank which will enable continuous records to be obtained of the pumping.

Filter bed no. 10 has at last been brought into use though the work was not satisfactory. During the year two slow sand filter beds were completely renewed. An additonal mechanical sandwasher would be a great assistance in the re-sanding of filter beds.

Considerable extensions of the distribution continuously took place in the past without any properly organized plan and this method is now leading to serious trouble.

Compared with other municipalities the maintenance cost per 1,000 gallons are low, but the income which this board derives is also very low, thirty per cent. arrears of revenue have been pemitted to remain uncollected.

The board are indebted to the water-works superintendent for maintaining a continuous supply under very difficult circumstances, and for a profit of Rs.33,785 at the close of the year.

University water supply (two tube-wells for Rs.0·34 lakh)—A forecast of cost for two tube-wells for Benares University was prepared in August, 1932.

Water supply and drainage—No developments have taken place with regard to these projects during the year. Both require revision before the work can be carried out. The revision of the water supply project presents little work, but until all the tube-wells have been sunk and tested it cannot be completed. BRINDABAN.

The Board of Public Health in their meeting of March, 1933, sanctioned the use of the tube-well, constructed by a grant-in-aid in the year 1931, by the "Sarah Edward Crighton Memorial Hospital" authorities, who will shortly instal a suitable plant for supplying water to their hospital.

The drainage project must remain in abeyance till there is some prospect of money forthcoming.

BRINDABAN—(concld.).

Infectious diseases hospital—Tenders were called for the work on 5th November, 1931, and the work was completed on 31st January, 1933. Certain other works, such as underground drainage, have been recommended, but the Board of Public Health has decided to provide funds only when the municipal board agrees to maintain proper staff and equipment for the hospital.

BUDAUN.

Drainage (Rs.0·89 lakh)—The works were commenced two years ago and were completed within the year 1931. But as certain portions of the works were not certified as complete until October 24, 1932, special measures were involved under the terms of the contract and a report was submitted to Government.

CAWNPORE.

Water supply maintenance—The plant which was recently installed has given satisfaction and the old steam sets at both stations are now merely retained as stand-by. The tube-well completed in 1913 still remains a valuable asset to the filtered water supply and the board are providing gauges and meters so that a record may be kept of the supply from this well. Few repairs were found necessary during the year and the board took steps to obtain all the necessary spare parts required for the plant.

During the greater part of the year raw water from the Lower Ganges Canal is used in preference to a supply from the riverside pumping station. This latter plant constitutes a stand-by in case of canal closure.

The board have taken steps to provide a boundary wall to the slow sand filters. This will prevent storm water during rains finding its way into the filter beds and vitiating the process.

Cawnpore still maintains the largest percentage of metered private connexions and it is to this fact that a good margin of profit is earned enabling the board to undertake all necessary improvements and extensions without recourse to Government assistance. The manner in which the supply is maintained in Cawnpore compares favourably with that of many other plains municipalities.

A profit of over Rs.2·50 lakhs regularly earned by this supply reflects great credit on the board and its staff.

Drainage—This system is by far the greatest of any in the Province and the board continually make extensions. The large quantities of sewage which are discharged into the Ganges have, on several occasions, received adverse comment. The fouling of the Ganges, however, takes place some miles downstream of the populated area and the complaints arise more from a sentimental or religious standpoint than from any adverse effect on the public health.

Water supply to the Criminal Tribes Settlement at Kalyanpur, Cawnpore—The wells in the settlement area were found to be contaminated and the work of cleaning and test pumping them was satisfactorily completed.

Sewage disposal (Rs.5·22 lakhs)—This project was taken up at the request of the board mainly as a means to prevent pollution of the Ganges. It provides for pumping sewage by electric pumps from the outfall at Jajmau about six miles from the town and treating it on an extensive farm of about 500 acres. This project has been approved by the board and they have applied to Government for a grant-in-aid of half the estimated cost.

Permat Sewage Pumping Station Reorganization (Rs. 2·07 lakhs)—Owing to extensive sewer construction the pumping station at Permat cannot cope with the increased flow. The preliminary proposals have already been approved by the board and the final project will be furnished them shortly.

Cawnpore drainage, Part VI (Rs.2·25 lakhs)—This project comprises the drainage of old Cawnpore and is held pending the time when staff will be available to complete it.

A project for the drainage of the Harcourt Butler Technological Institute has been prepared at the request of the Director of Industries, Cawnpore, and is nearly ready.

A project for the drainage of the Industrial School is also nearing completion.

DEHRA DUN.

Softening and chlorinating plant, supplementary work.—The new pipe line, required below the Kolukhet chlorinating plant, to improve the hydraulic grade under maximum demand, was included in the supplementary project and the work is now well in hand.

Water supply—The annual water shortage is again becoming a matter of pressing importance; distress was particularly acute last hot weather on account of the drought.

Several schemes for increasing the supply have been mooted. The first was from the Mathranwala springs, from which source the forecasted cost of a supply amounted to Rs.4,11,800. This scheme did not find favour as a water tax was necessary to meet the capital outlay, and heavy running charges were involved in pumping.

DEHRA DUN —(*contd.*).

A second proposal is being considered whereby water of a more or less satisfactory nature can be piped from the Bandel river near Maldevta—a point south of the Baldi springs. This source is at a higher level than Dehra Dun and a gravity supply is possible. The capital involved will be about Rs.4 lakhs. The waters of this river are however conserved by the Canal Department for irrigation purposes and Government has been moved to allow the board the continuous use of about 1½ cusecs from this source.

The main existing source from Baldi now shows signs of falling off on account of heavy incrustation in the leading main which is five miles long and the water from this source is exceedingly hard.

Well-boring plant capable of dealing with the boulder formation encountered in Dehra Dun is now locally available, the question therefore of using tube-wells within the municipal limits of Dehra Dun and thereby saving several miles of leading mains is also being investigated.

Drainage—A project for dealing with the western portion of Dehra Dun which is in a very unsatisfactory state is in hand and the board are pressing for the mohalla Lakhi Bagh section of this project, as it is the most urgent.

Owing to the shortage of staff and pressure of other works, this project has been held up.

Sewage disposal—This existing sewage farm is now quite insufficient to deal with the quantity of sewage from the western portion of the municipality and large quantities run to waste in the adjoining ravines. The board have acquired land and the Executive Engineer is preparing proposals for extending the distributaries and bridging the *nalas* separating the new land from the existing farm.

The board have been provided with tender forms and agreement forms on the lines of those which experience has shown to be useful in the case of the Muttra sewage farm. As soon as the board can bring these into operation, they will benefit by a considerable increase in the revenue from this farm.

Infectious diseases hospital—The hospital buildings were completed and handed over to the board on the 20th December, 1931. Since then, at the request of the board, an underground system of drainage has been provided with liquefying tanks and filters and in addition to this work, the buildings and compound are being equipped with electric light and fittings.

DEWA (BARA BANKI).

Water supply (*Rs.*0·57 *lakh*)—This work consists of a tube-well supply intended to provide water for people attending the annual fair at Dewa. An 8-inch diameter tube-well of the gravel feed type was completed and tested and a length of about 1,300 feet of cast iron distribution main was laid. Specifications and contract documents for the pumping plant, engine house and the distribution system have been prepared. Tenders will shortly be invited.

Temporary water supply in mela, 1932 (*Rs.*0·018 *lakh*)—This work was undertaken at very short notice on behalf of Dewa Fair Committee. The temporary air-lift plant erected for test pumping the tube-well was used and temporary distribution piping and service tanks were provided. The work was completed in time and the supply was satisfactorily maintained during the Mela.

FATEHPUR-SIKRI.

Water supply—The system which was brought into operation in 1930 has given complete satisfaction and very little repair work has been found necessary either to plant or to distribution. This supply and the supply to the *melas* held annually depend upon one tube-well and one pumping set. The Committee would do well to seize the first opportunity of duplicating their pumping plant, for the supply shows signs of increase and in the event of any accident or extensive repairs being required, the public will be subjected to great inconvenience.

The distribution was extended specially to meet the requirements of pilgrims attending the *Durgah* during the *Urs melas*; the work was completed in March, 1932, water has been successfully supplied.

New standposts have been erected in certain areas also at the request of the Committee.

Out of total demand of Rs.2,697 only Rs.1,020 was recovered leaving a large amount in arrears. This fact resulted in increasing the deficit to Rs.2,845.

Drainage—The waste from the public standposts causes a nuisance in some mohallas and the board would do well to consider drainage improvements.

FYZABAD.

Water supply maintenance—One of the original tube-wells became choked, probably owing to a defect in the strainer and this has appreciably reduced the discharge as far as the original installation is concerned.

The supply from the new tube-well was fortunately available which more than made up for loss of one of the original wells. The new tube-well pump, however, showed a diminution of 40 gallons per minute from its designed discharge of 300 gallons per minute and this reduction combined with a fall in the air receiver pressure could

FYZABAD—(*concld.*).

not be accounted for by any change in the sub-soil water level. Investigations were therefore undertaken and it was discovered that the foot-piece and two lengths of air-pipe had become loose in the well. The air pipes and the foot-piece were recovered from the Bore and the work of rejointing is in hand.

The Board of Public Health gave a grant to the municipality towards the cost of a new tube well to replace the original well, now out of action, but the Board demur at finding a similar sum to provide air compressing plant to enable the full benefit of this new well to be derived.

An increase of 14 per cent. in the quantity of water supplied during the year took place and an average consumption of 16·7 against 14·3 gallons per head per day was recorded.

The plant at both the Diesel stations and the new well worked satisfactorily throughout the year. Trouble was experienced owing to members of the staff maliciously tampering with the adjustments of the Diesel plant, probably the result of personal enemity. The Board did not take sufficiently prompt and effective steps on previous occasions and the matter was therefore reported to Government.

The venturi meter tube has been removed and re-erected at a new site after being reconditioned by the makers representative.

The number of house connections increased from 1,261 to 1,372 during the year but the Board steadfastly refused to apply meters erroneously adducing grounds of economy. Inspite of many difficulties the revenue exceeded the annual charges by Rs.6,864.

A supplementary estimate amounting to Rs.5,173 for reinstating the venturi meter and improving the drainage arrangements at the new pumping station compound and providing compound walling, was sanctioned and funds having been found from savings these improvements were completed during the year.

AJODHYA (FYZABAD).

Ajodhya water supply. Construction of two tube wells—These tube wells are meant for public water supply at Ajodhya. One 6″ diameter well of the gravel feed type was completed in 1931 and the yield was very satisfactory. Funds for the construction of a second well were received in March, 1931, but the municipal board has not been able to acquire a site for the purpose even though an advance from the allotment was sanctioned by the Board of Public Health for such purpose. It was reported that the price of the proposed site had increased still further. A second site was selected in consultation with the Chairman but still the possession of the land has not been given. Work on the second well will be started as soon as the site is acquired. This case illustrates the imp otance of local authority, where land belonging to influential individuals is to be acquired for public purposes.

GHAZIPUR

Water supply Trial tube well for Rs.0·20 lakh—The question of a water supply to the town has been pending for a long time. An estimate for a tube well was prepared in 1931–32 but for want of funds it could not be constructed. The Board of Public Health now have found it possible to give a grant of Rs.18,000 for this well. The work will be taken in hand as soon as the Board have gained possession of the site.

GOLAGOKARAN NATH.

Water supply maintenance—This pumping plant is primarily intended to supply drinking water to pilgrims attending the Chaiti and Amavas Melas held in Gola every year. Water is also supplied to Gola town for drinking and road watering.

Gola town area and the zamindars use water from this water works, but do not contribute anything towards its maintenance and the whole amount is met by the District Board, Kheri. The discharge of the tube well supplying water has diminished to such an extent, that the well should be cleaned by compressed air, the cost of which is estimated to be Rs.1,200.

The second set which was out of order has been overhauled and necessary replacements made. Number I set is out of use at present for want of certain parts. Orders for spares have, however, been placed.

GORAKHPUR

Drainage (Rs.3·44 lakhs)—This drainage project was administratively sanctioned by the Board of Public Health in September, 1932.

Tenders for the construction of the Kawadia Ramghat storm water drain were opened at a public meeting by the Chairman at Gorakhpur on 18th October, 1932. The lowest tender amounting to Rs.67,541 was accepted. The work is well in hand.

HARDWAR

Water supply maintenance—The supply was maintained in good order throughout the year and the pumping plant functioned satisfactorily. The low tension panel which cracked will be replaced shortly.

The revenue including the annual subsidy of Rs.30,000 amounted to Rs.53,790. The maintenance costs were Rs.33,954 so that a profit of Rs.19,836 was realized. The daily consumption now averages 20·40 gallons per head.

It is of great credit to the Board that all its water dues had been collected by the end of the year, no arrears remaining. HARDWAR—(*concld.*)

Effective control is exercised over the distribution by this Board.

On account of the drought, wells no. 2 and 3 did not yield as much water as was expected. Good rains during 1932, have, however, improved the situation and the three wells now shew the following yields:

Well no. 1, 189 gallons per minute with 3 feet depression.
" 2, 182 " " 5 " "
" 3, 180 " " 5 " "

The steinings of the wells are in good order with the exception of well no. 3 where little percolation is evident.

Fourth well—To meet the falling off in yield owing to drought and in view of the periodical Mela demands proposals were prepared for a fourth well and pumping plant. The site of this new well was chosen in the compound of the Municipal Inspection Bungalow.

It was originally proposed to construct a fourth surface percolation well, but the supply from the existing wells which are of this type, have on several occasions been questioned. It was, therefore, decided to construct a tube well and obviate the risk of contamination. After several failures on account of hard boulder formation the contractors have managed with the aid of special boring appliances and tools to carry the boring to the required depth of 150 feet below ground level. The development is yet to be completed.

Temporary water supply to Adh Kumbh Mela—Since the tube well could not be got ready in time in spite of persistent efforts, it was decided to arrange the supply during the mela by means of a temporary steam plant. The estimate amounting to Rs.7,272 was sanctioned by the Board of Public Health who also granted full funds for the work. The plant had been installed on the well at Parao Jatrian, and was held in readiness for emergency pumping, though the water available was not of excellent quality.

A separate estimate has been sanctioned for the 8″ rising main to link the tube well with the existing supply main and tenders for the latter have been received.

Drainage—The Hindu Mahasabha have constantly opposed the drainage work being undertaken at Hardwar on religious grounds and foul water still continues to be discharged at numerous outlets along the sacred ghats and esplanade, in the midst of a bathing public.

Recently the Mahasabha have shewn signs of relaxing their opposition if arrangements can be made whereby the main intercepting sewer is constructed to deliver the sewage on land, where it can be treated and prevented from contaminating the Ganges river in its course through the Patri Jungle. The levels allow of such an arrangement.

Additions to the infectious Diseases Hospital.—A project for the work was prepared, sanctioned and funds were provided by the Board of Public Health. The work is well in hand and the two quarters and laboratory block have been completed and will be handed over to the board in good time for the mela.

Electric supply—The distribution was well maintained by the municipal board during the year and 347,326 units were sold. The total running charges including sinking fund and interest amounted to Rs.66,307 whilst the revenue received amounted to Rs.70,512.

There is a controversy between the board and the Hydro-Electric Department of the Irrigation Branch, who fix the bulk rates at such a low figure that the board is permitted to charge only one anna three pies per unit to consumers such as the railway, whilst the Irrigation Branch relieves them of one anna for the power supplied. This results in a narrow margin of three pies per unit to cover distribution losses and costs.

The board are under the impression that they are being discriminated against, in that the Irrigation Department insist on charging two annas per unit for power for water supply pumping whilst the railway authorities get their supply for one anna three pies per unit.

Water supply—The board having agreed to levy house tax and funds having been made available, tenders were called for and received on 7th February, 1933. The work is to be let in two contracts, the first includes the supply and erection of pumping plant of the electrically-operated air lift-cum-centrifugal pump system, and the second contract is for the rising, supply and distribution mains, reservoir and building work. The tendered amounts were considerably below the estimate prepared a few years ago and the board are considering the recommendations made on the tenders. HATHRAS

Water supply (Rs.4·11 lakhs).—The detailed proposals were prepared at the request of the municipal board and in compliance with the orders of the Government JAUNPUR

JAUNPUR—(*concld.*)

contained in G. O. no. 4073/XI—G.-II.E., dated the 22nd March, 1932. The proposals have been divided into two working instalments. The first instalment includes a riverside intake well and pumping station, 7″ diameter rising main, elevated storage and sedimentation tanks and a battery of three 7′ diameter rapid pressure filters and distribution mains in the more important portions of the town. The second instalment allows for a second intake well and pumping station, duplicate rising main, open gravity type of rapid filters to work in conjunction with pressure filters, filtered water pumping station and an extensive distribution system. The cost of the first working instalment amounts to Rs.1·47 lakhs. The scheme has been sanctioned by the Board of Public Health and the preparation of contract documents is in hand as the board are anxious to give the public a much needed supply of sweet water.

JHANSI

Water supply maintenance—Both pumping sets were reconditioned and the necessary replacements made. Two more defective suction pipes leading from the Pahuj dam were also replaced. Repairs to the rising main were also undertaken.

The board does not make satisfactory arrangements for the coal supply. Frequently coal has to be obtained on loan from a local ice factory. Since proper contract forms and specifications for the supply of coal have been furnished the board, there should be no excuse for not entering into a proper fuel contract, necessary for safeguarding the board from loss, and from a stoppage of the public supply owing to depletion of the coal stock.

The board has managed to more than cover the annual charges of its water supply for some years past now, but generally the water supply to Jhansi is scanty and the subject of complaints.

Service reservoir—At the request of the board a project amounting to Rs.0·45 lakh to construct sedimentation and clear water reservoir and provide chlorinating plant, was furnished them. By allowing for night storage this reservoir will make an appreciable increase in the supply possible.

CHIRGAON, DISTRICT JHANSI

Drainage extension (*Rs.* 0·06 *lakh*)—Savings of Rs.6,000 from the main work were utilized under proper authority for extra works of drainage in the town. This was carried out at a cost of Rs.5,404 and the balance of funds returned to the Collector, Jhansi.

KAIMGANJ

Drainage—The works were completed and handed over last year. The work was properly maintained and the final bill of the contractors was paid this year and the accounts were closed.

The system is functioning satisfactorily.

KANAUJ

Drainage—Work on Block "E" which forms part of a complete drainage scheme has been considerably delayed on account of the inability of the board both to acquire platforms and land required for improving the roads and to deposit the amount of the estimate. On the board agreeing to a programme of funds, tenders were invited and these were sent to the board for approval. The municipal board failed to come to any decision within the period the tenders held good and afterwards demanded that the scheme be revised so that the platforms which were acquired but not taken possession of, might be resold to their owners and that widening of the roads might be omitted. This amounted to a complete repudiation of their former decision as the whole purpose of the drainage work was defeated. It is a clear indication that the public at Kanauj do not think drainage work necessary.

KOSI

Water Supply Maintenance—The pumping plant received fair attention and stands in good running order and the supply was well maintained throughout the year. The discharge of the tube well remained satisfactory. During the year inferior crude fuel oil was purchased by the committee which brought about a sudden stoppage of the engine. Since proper fuel has been purchased no further trouble has been experienced. The necessary spares to effect replacements were maintained. Too many spare parts are consumed when the list is compared with similar plant installed at other places. More care must be devoted to the maintenance, if this expense is to be saved.

Considering the small number of connections, numbering 19 private connections and 27 standposts, the financial position of the supply is satisfactory. During the year under report the total revenue earned amounted to Rs.7,849 while the expenditure incurred on maintenance amounted to Rs.5,155. This indicates how a small water works can be made to pay in the early stages of its life.

The supply to the town is, however, dependent on one tube well and one set of pumping plant. It would be prudent for the notified area committee to duplicate the equipment as soon as funds can be made available.

A cheap type of fitting is being used for connections by local plumbers which should be discouraged.

LUCKNOW

Water Supply maintenance—The silting of the river intake at Gaughat is still in process and recourse has now to be taken to clearing this of silt weekly. No

steps have been taken to give effect to the recommendations made several years ago for training the river.

In last year's report, it was recorded that a crisis had taken place in the supply owing to damage to the Gaughat pumps, due to want of proper maintenance. On that occasion the electric supply company came to the rescue. During the year under review, a crisis again occurred in June when owing to the absence of a qualified water works superintendent, the pumping plant again relapsed into a dangerous state. At that time Lucknow was in the throes of a heat wave, the hospitals were full to overflowing and many heat-stroke deaths were being daily reported. The pumping station was removed from the control of the board for a few days and the re-instatement and care of the pumps entrusted to the Resident Engineer of the electric supply company. The public electric supply was vitally affected in that any interruption in the supply of water would cause a stoppage in the electricity supply, since the company's turbo-generator plant depended for its condenser water, on the municipal water supply.

The board, however, resented this removal of the station from their charge so keenly that a compromise was arrived at and the Resident Engineer undertook the overhauling of the plant and its maintenance until the work should be completed. It should also be recorded that for over almost two years previously the board had not employed any water works superintendent and that this crisis occurred whilst no superintendent was in charge. Then and not till then did the board see its way to employ a superintendent and in doing so failed to take advantage of advice given them.

The board were urged to set about providing a new third pumping set immediately in view of the precarious condition into which the existing two sets had fallen through neglect and misuse. The board, however, neglected to take any steps until another crisis took place in January, when the insulation of one of the motors was punctured by lightning and the motor thrown out of use. Thus for the third time in the space of one year the Lucknow public were subjected to a serious risk in the complete breakdown of both the water supply and the electric supply.

The East Indian Railway authorities and the supply company, however, working in collaboration managed to replace the defective coils and get the set working within a fortnight of the motor being put in their charge.

The grievous state of the plant both at Gaughat and Aishbagh reveals gross neglect in maintenance. Bearings which should have been run up with white metal were found to be made of a substance resembling impure lead. The six-inch diameter mild steel shaft of one pumping set was found to possess indentations such as might be caused by a sledge hammer and the shaft was found to be bent about 1/8th inch.

The board have at last after great delay arranged for a third pumping set at Gaughat but it is unlikely that this set will be ready in time for the hot weather.

The re-sanding of the slow sand filters and the cleaning of settling tank no. 2 was carried out during the year and it is said that the intake valves were repaired. The valves and the rising main, however, have not been operated for years and have become corroded so that they cannot be operated. A new set of chloronomes has been purchased to replace the pulser type.

The board dare not increase the number of meters nor attempt to control the great waste which takes place, attributing their attitude to the unpopularity which would result from such a course.

Out of 2,764 connections of 1/2" size and above, only 528 are metered. This board has only this year complied with G. O. no. 531/XI—226-1926, dated the 18th February, 1928 and now even only partly. Although a sum of Rs.72,393 has been credited to water works for such service, yet in the municipal accounts credits and debits of this amount have not been shown. The distribution of water exhibits the greatest inequalities. Some areas receive no supply at all whilst others enjoy a continuous supply.

The profit on the year's working amounted to Rs. 1,94,695. No clear indication is given as to how this profit is spent but it is certain that it is not employed in improving the water supply and for this reason it would appear that the board are acting illegally if section 129(*b*) of Municipalities Act, 1916 is considered. The neglect of the board to maintain their water works properly has resulted in an expenditure of about Rs.0·97 lakh being necessitated in a new set and in repairs and special replacements, a very heavy loss.

It is abundantly clear, however, that the Lucknow tax payers will have to foot a still heavier bill shortly.

Sewage pumping—It is being reported that all four sets were overhauled and worn out parts replaced and that the one set of sludging gear has been replaced and brought into operation, whilst the other is under repairs. In spite of this only a small

LUCKNOW—(*concld.*)

percentage of the total sewage flow is dealt with at the station and on many occasions the station has been discovered to be out of operation with the doors locked.

Drainage—Some work was effected in repairing the breach on the main intercepting sewer and some further work is in process, but no effective measures have been taken to deal with the scandalous discharge of sewage into the Gumti at several places on the alignment of western intercepting sewer.

Sewage farm—Only a small fraction of the Lucknow sewage is pumped to the farm and of this quantity only a small portion is treated on the land, the great bulk being allowed to flow to waste. The land has been let to middle men on a five years' lease and an insignificant sum is realized by the board for this lease.

Tube Well for Queen Mary's Hospital (*Rs.*0·037½ *lakh*)—A forecast was prepared for providing a water supply from a tube well to the Queen Mary's Hospital. Lack of funds prevents the work being taken up.

Maintenance of Gumti Weir (*Rs.*0·014 *lakh*)—The works were satisfactorily maintained by the 2nd division during the year.

Anti-malarial and Drainage works—Ghazi Uddin Hyder Canal Maintenance (*Rs.*0·08 *lakh*)—The works were satisfactorily maintained as usual during the year. Two connections, one from the railway colony and the other from private premises, were made to the sewer during the year.

A tendency has been noticed from the adjoining local authorities to ignore the rules laid down for the maintenance of this work. Unauthorized and defective connections have been reported and are being dealt with.

MEERUT

Mr. Singlehurst, who had occupied the post of Water Works Superintendent at Meerut with efficiency and skill for many years, retired on the 1st April, 1932. The board failed to appoint a successor and the water turbines, pumps and filtration plant were left in charge of a driver until the following November, when superintendent was appointed on probation.

The new superintendent on taking over found the turbines and the pumps in a most unsatisfactory condition, and since the matter was reported to be serious, the Superintending Engineer specially inspected Bhola.

The municipal board were warned about the critical state of their plant and advised as to the steps that were immediately required.

The board failed to benefit by this warning and spent much time in disputing whether they should pay the travelling expenses of the manufacturer's engineer and the plant has remained in an unsatisfactory and even a dangerous state for some months past.

This water works having paid off the original loan and not incurred any further loan for renewal work, now possesses the cheapest water supply in the province; but it neither levies a water tax nor applies proper ferrule charges. For the first time in the working of this water supply, the board has been able to more than cover its maintenance charges, by declaring a profit of Rs.9,242 but this profit can be doubled or even trebled if proper steps are taken to improve finances. The smallest private connection is ⅝", not ½" as in other municipalities, and the bulk of the water supply is absorbed by a few favourably situated consumers at the expense of the majority who seem to view this state of affairs with complacency.

The painting of the service reservoirs at the Tahsil has not been carried out for several years.

The Civil Lines population complain much of the shortage of water and forecasts of cost have been furnished the board for the alternative methods of dealing with this, but so far the board have come to no decision.

Drainage—No significant addition took place to the drainage work at Meerut during the year, the system being a purely surface system.

MIRZAPUR

Water Supply maintenance—The working charges of the gravity supply are in company with Meerut the lowest in these provinces, there is no water tax, and no proper ferrule rating is enforced. Proper water supply rules also are not imposed.

The venturi meter, although returned from the makers after repairs two years ago, has not yet been fitted up, it is stated on grounds of paucity of funds.

Standposts have increased to great numbers. Originally only 66 standposts were installed, but the number has now reached 261; the most of these are leaky and ill-maintained.

This board is averse to metering and persists in replacing the existing meters by ferrules.

The board does not accept advice on technical matters, it also allows 26 per cent. arrears of tax to remain uncollected.

MIRZAPUR—(*concld.*)

The number of connections at the end of year were 2,872 against 2,763 of last year.

The maintenance charges amounted to Rs.27,076 while the revenue was Rs.32,608 yielding a profit of Rs.5,532.

BINDHACHAL (MIRZAPUR).

Water Supply (*Rs.0·68 lakh*)—The board requested a forecast of cost for a water supply to Bindhachal town, which is an important pilgrim centre about four miles west of Mirzapur. The scarcity of water is greatly felt during the yearly mela in April. This forecast has been furnished to the municipal board.

MOGHALSARAI

Drainage (*Rs.0·32 lakh*)—Tenders for the work were opened in public by the President, Notified Area Committee, on 4th January, 1932, and the contract was placed on 4th January, 1932. The East Indian Railway authorities would not allow the Notified Area Committee to connect the town drains to the railway outfall drain until certain conditions were complied with by the Committee. There was also delay in the acquisition of the land near the wells on which pumps were to be installed.

The commencement of the work, on this account, was considerably delayed and the order to commence was not issued to the contractor till 21st March, 1932.

During the progress of the work, several additions and alterations were carried out at the request of the Committee.

An extension of the completion date till 31st December, 1932, was, therefore, sanctioned but the work was completed before the expiry of this period. The work is now in the maintenance period and has vastly improved the sanitary condition of the town.

Water Supply—The municipal board have evinced a desire for a piped water supply and they have been furnished a forecast of cost amounting to Rs.32,643 with a tube well as the source of supply.

MORADABAD.

Water supply—A forecast of cost amounting to Rs.1·25 lakhs was furnished the board in consultation with the Chief Engineer, Irrigation Branch. So far the board have not come to any conclusion on this proposal. The board permit the standposts, which are supplied from the existing well, to be very little used.

The electric motor which was erected in place of the wrecked oil engine referred to in previous reports has been completed and handed over to the municipal board. The tests show that the new installation is satisfactory and the low voltage which was at first complained of, can now be corrected by the Supply Company.

The pipe line distribution and fittings do not receive proper attention and repairs.

Drainage—The system of sewers constructed in 1910 have been neglected, some have become blocked, manholes in some places have been covered by masonry platforms of the adjoining property and in some places even houses have been built over the alignment. Bitter complaints have been received about the nuisance which is prevalent in the town owing to the blocked and unflushed sewers.

The Executive Engineer, I Division, undertook a detailed examination of the system and has prepared a forecast of the cost to put the system in working order.

A house tax was introduced some years ago to meet sinking fund and interest charges on the loan for the drainage works. There are proposals before the board to abolish this house tax. In the face of the urgent need for improved sanitation this proposal is unjustifiable.

MUSSOORIE.

Water supply—The plant at all the four pumping stations was maintained in good running order. In the case of Murray springs, the sets are now twenty-five years old.

Sufficient spare parts were maintained and the necessary running repairs undertaken during the year.

The distribution system was satisfactorily maintained. The average consumption of water per head per day amounted to 26 gallons compared with 27 gallons of the year 1931–32.

The water works accounts show a small annual loss, but this is due to the board's failing to credit a fair figure for the cost of water used. The hydro-electric and water supply joint accounts show a substantial profit, and since details are maintained separately for each undertaking, there can be no excuse for not assessing the actual cost of water correctly in the accounts.

During the year the board made sufficient funds available to enable a pipe line to be laid from Chalmer's Khud spring to the existing collecting cisterns. This extension will enable the MacKinnon pumping station to run for considerably longer hours during dry weather.

Hydro-electric supply—The excessive quantities of silt which are being carried down in the power pipe lines still cause trouble in scouring the spear heads, jets and pelton wheel cups.

MUSSOORIE—(*concld.*)

The hills on both sides of the power station exhibit signs of movement and give grounds for anxiety. A slip of any extent on either side might easily put the Galogi station out of action for a considerable period. For this reason the provision of fourth Diesel set at Kaulagarh station is being seriously considered.

Funds were made available in 1931–32, so that the board might proceed with the construction of settling tanks to do away with the silt trouble and to lessen the danger of the power pipe lines being put out of action by large quantities of silt brought down in stormy weather. The board were given this loan as a special case, though they had not complied strictly with the rules governing the release of funds. The contract for the work and arrangements for supervision were unsatisfactory, with the result that inferior work has been done and the estimate has been exceeded, further funds will be required to replace the defective work.

In the meantime the scouring trouble still continues and the danger of a shut-down has not been effectively dealt with.

The Diesel station at Kaulagarh stands in good running order and during the year was inspected and adjusted by an expert from the manufacturers. The process of equipping the central workshop has begun and some of the machine tools have already been put to use.

Two subordinate members of the staff suspected of sabotage were dismissed.

In spite of considerable difficulties, the plant at all stations has been used and maintained in a very satisfactory manner and credit is due to the board's staff.

Drainage—Preliminary proposals amounting to Rs.1·16 lakhs for extending the Landour Butcherkhana sewage outfall to Sewage Farm in Khaksians were received from the board for opinion and the Executive Engineer inspected the alignment and advised the board to attend to a number of technical points while preparing the detailed scheme.

The existing systems of drainage were properly maintained and no complaints were received. The extension of sewers would solve the difficult question of disposal of nightsoil, which still is a nuisance.

MUTTRA.

Water-supply maintenance—The pump of the A. C. set on examination proved to have its casing eroded to such an extent that extensive leaking was taking place between the delivery ports and the suction side. This set has been out of commission since January. The remainder of the original plant is in fairly good order.

The new 5th tube well and the motor driven airlift and centrifugal pump which was tested and handed over to the board in August, 1932, has given satisfaction. This installation together with the Diesel generating set and the original D. C. horizontal pumping unit, running in conjunction, have maintained the supply effectively. Orders for a complete new pump have been placed which will be substituted for the existing set as soon as it is delivered.

The spares recommended have been provided by the board and advice has been followed by the board regarding the upkeep of their pumping plant.

Since the reinstatement of the foot valves in the original three wells and reconstruction of well no. 1, a satisfactory yield has been obtained; these wells afford over 860 gallons per minute on an average working in combination. The overhauling of the joints in the suction range in the tunnels connecting the wells has enabled this satisfactory result to be obtained.

This year an increase in the water-supply to the town was given, the pumping hours being extended during the hot weather.

Complaints from the high zone area are frequent and waste is prevalent in the low lying areas. The Executive Engineer, I Division, has provided proposals for isolating the high zone area and for providing a boosting pump.

The balancing tanks have not been painted for a period of years and rust has attacked the bottom plates which are now leaking at several places.

Very little has been done by the board in the matter of increasing the number of metered connections, in realizing arrears and in tightening up the water-tax assessment. Out of 155 connections of one half inch size and over only 48 connections are metered.

Some extension of the distribution system took place during the year and several standposts were added. Shortage is bound to become more acute until the distribution is properly controlled.

The income derived from water-supply amounted to Rs.79,270 for the year whilst the total running charges including interest and sinking fund amounted to Rs.82,794.

Water Supply Extension. Construction of the 5th tube well and installation of an air-cum-centrifugal pumping plant. (*Rs* 0·55 *lakh*)—The four existing 9" tube wells which supply the town became insufficient to meet the increased

demand. A suitable pumping plant to pump into the existing rising main and an additional tube well were comprehended in the scheme. The tube well was constructed in 1931-32 and the erection of the pumping plant was completed in July, 1932. The new 12" tube well is of the gravel feed type and an air-lift-cum-motor driven centrifugal pumping plant is employed to augment the supply from the four existing tube wells. The installation was completed and set to work in July, 1932, and has increased the town supply by 300 gallons per minute. The plant complied fully with the guarantees under the contract.

MUTTRA—(*concld.*)

Sewage pumping—The oil driven pump together with the electro motor pumping sets functioned satisfactorily throughout the year. Replacements of parts took place and the overhauling work was properly attended to. The screening and sludge elevating gear was also kept under proper repairs.

Sewage Farm—The sewage farm was managed successfully by the I Division for three consecutive years ending 31st May, 1932. Charge was handed over to the board on 1st June, 1932.

The divisional staff assisted the board when the plots were auctioned for the year 1932-33, and the overseer who supervised the farm on behalf of this department has been transferred to the municipal board.

The plots were auctioned for Rs.6,762 for the year 1932-33 against the sum of Rs.5,856 for the previous year (it should be noted that a sum of Rs.369 only was realized at the first auction in 1929-30).

The tender and agreement forms and cultivation plans were furnished to the board also.

Extension of the outfall drain—Police Lines—A forecast of cost amounting to Rs.16,000 has been prepared this year at the request of the board for extending the outfall drain, which was completed in 1928 as a further anti-malaria measure.

MUZAFFARNAGAR

New Mandi drainage—As reported last year this work has been completed, within the limit of funds available, but the accounts have not been settled because the contractors refuse to accept the final bill and claim Rs.28,000 extra.

The Superintending Engineer in his capacity of arbitrator under the contract is examining these claims.

During the process of the construction of the New Mandi drainage work at Muzaffarnagar numerous encroachments on several roads falling within the Mand area have taken place. The board have taken no steps to put a stop to this practice; on the contrary they have encouraged the property owners in their nefarious activities.

The Merchants Association originally laid out the building estate in rectangular blocks and the sanctioned project provided a 20 feet clear width of road between the building line and the drains both on the western and eastern sides. Since the buildings which have been erected in the Mandi do not conform to the designed lay out drainage difficulties are already arising. In many instances, buildings have been started without the necessary plans being previously approved by the board. On objection being raised by the Executive Engineer the construction of these buildings was allowed to become far advanced before the board served the house-owners with notices to demolish the buildings. The result was that the owners filed an appeal, and the board allowed the appeal on the plea that the demolition of the buildings would be a real hardship on the appellants.

These farcical proceedings and the fact that over nineteen cases of encroachments had taken place were reported to Government.

Government has agreed that no further assistance should be afforded this board in view of the scandulous way in which a score or so of encroachments up to 6 feet in width have been carried out within a very short period of the execution of the drainage work.

NAINI TAL.

During the regime of the board's former engineer, the hydro-electric and water supply plant relapsed into a most precarious state; the new electrical and mechnical engineer has had an unenviable task in meeting the public demand, whilst at the same time in endeavouring to reinstate machines on the brink of failure. The burning out of the lakeside motor was referred to in a previous report, but at the commencement of the season the crankshaft of no. 5 three throw pump fractured leaving the whole demand of the high zone to be pumped by set no. 6. This set for many months previously was thought to be in a more precarious state than set no. 5 which failed. A new crankshaft was cabled for and the fractured crankshaft which weighed almost a ton and manufactured of solid steel 6 inches diameter was rewelded, reset, annealed and ground to gauge along with new bearings at the Lucknow railway workshops for which the board are indebted to the East Indian Railway authorities for prompt and clever work.

Each of the six sets serving the three zones of supply was dismantled in turn and overhauled under circumstances of the greatest difficulty as the new engineer

NAINI TAL—(*contd.*)

had to personally supervise each operation, as it was found that no member of the staff was capable of carrying out even petty repairs. A number of spare parts have already been purchased and still more are on order.

During the year 24 new private connections were granted and owing to timely rains the gravity supply was better than in the previous year.

The water supply showed a net profit of Rs.13,891 on the year's working.

Hydro-electric supply—The best that can be said about this system is that its state perhaps was not so bad as that of the water supply. The new electrical engineer had many faults to contend with, one of which he succeeded in tracing to the fact that some transformers had their ranges of tappings misconnected to the instruments which rendered the location of faults very difficult.

Few spares have been purchased and it was not until defects came to light that the necessity for ordering spare parts become apparent.

During the year on two occasions the supply was interrupted, the first being due to lightning rupturing insulators on the Patwa-Dangar line and the second was due to a snowfall causing trees to fall upon the transmission lines near Hawksdale.

The quantity of water used per unit generated at an average throughout the year amounted to 35·8 cubic feet, the effective head under which the pelton wheels worked at an average, was 1,500 feet.

Drainage—A project amounting to Rs.71,225 for improvements to sewerage and which included the replacing of the existing pipe line from Talli Tal Post Office to the cart road toll barrier was prepared by the Municipal Engineer and submitted to the Board of Public Health in October 1932 for their consideration and assistance. This project was considered a highly desirable work and was recommended for favourable consideration. In preparing the project G. O. no. 1015/XI—91, dated the 3rd April, 1930, were not complied with by the board and several other points of a technical nature were noticed in the proposals which should receive attention before tender forms are prepared.

No revenue is derived from the sewage farm.

PILIBHIT

Tube well with pumping plant and pump house (Rs.0·13 lakh)—This forecast was furnished at the request of the board and provides for a 5″ tube well with an oil engine driven pumping plant, and an engine house. It is specially required for road watering.

PIRAN KALIAR

Water Supply—This work was completed in August, 1931. Under orders of Government the plant and distribution have been handed over to the Sajjada Nashin on 26th December, 1932, on an agreement for the proper maintenance of the system.

Mela Water Supply—An estimate amounting to Rs 435 for running the plant during the mela of 1932 was prepared and the supply was maintained by the Well Boring Operations Division for about fifteen days. The supply was ample and the system gave entire satisfaction.

RAE BARELI

Water Supply.—No further steps have been taken by the board to proceed with a public water supply although a trial tube well was constructed and tested as long ago as April, 1929.

Jail Water Supply—At the request of the Inspector General of Prisons, the pumps at the district jail were overhauled and adjusted.

SANDILA (DISTRICT HARDOI)

Water Supply—At the request of the Sandila board, a forecast of cost for water supply to the town was prepared which includes an 8″ tube well bored to a depth of 250 feet, oil engine and pump with reservoir and distribution. The cost was forecasted to be about Rs.32,000 and the board are considering ways and means of financing it.

Nawab Muhammad Yusuf Meat Market (Rs.0·09 lakh)—Tenders for the work were invited and the contract was placed in the month of June. The work was completed before the end of the year. The maintenance period has also been completed. The handing over of this work was the occasion for an opening ceremony.

SHEOPUR (DISTRICT BENARES)

Town area drainage (Rs. 0·06 lakh)—At the request of the district officer drainage proposals to prevent the pollution of certain tanks in the town were prepared. These proposals include the preliminary treatment of sewage with a view to render it inocuous before its discharge at the present outfalls.

UNAO

Water Supply maintenance—All three tube wells with their air pumps worked satisfactorily throughout the year, the pumping plant also functioned satisfactorily with the exception of certain trouble due to cracking of combustion heads. This trouble is traceable to the fact that the cooling water rapidly deposits an incrustation and that unnecessarily large quantities of water were passed through the cooling jacket. In place of the superintendent who vacated his post in November, a successor on a lower pay was appointed. It is unfortunate that

UNAO—(contd.)

the board do not see their way to paying a reasonable scale of salary for this post for with the extension of the water supply and the additional station for sewage pumping fully competent staff is indispensable.

The water supply is very popular and the number of private connections has rapidly increased. The number which amounted to 94 in 1928 has now increased to 226. The present supply is being rapidly outstripped. The board took a loan for the purpose of providing meters in 1931. The meters were purchased many months ago, but it would appear that the board have not the courage to apply them for not a single meter has so far been installed.

Twenty-seven per cent. arrears of water revenue remained uncollected.

The maintenance charges including sinking fund and interest amounted to Rs.10,161, the income attained was Rs.11,060 so that a margin of Rs.899 in profit was available.

The savings from the water supply extension works were, after the necessary authority was received, utilized in constructing quarters for the superintendent, a godown and in increasing the size of the balancing tank.

Drainage—The work on the first instalment of the comprehensive drainage scheme was commenced in the previous year and the work is well in hand. The board of public health have given a further grant of Rs.13,000 to which the municipal board have added a sum of Rs.10,000. The bulk of this extra money will be spent in surface work and connections with the main sewer, with a view to intercepting as much foul water as possible, which will be delivered on the sewage farm by means of the pumps at present under erection.

In addition to the works noted above, this department has scrutinized and given advice under G. O. no. 1015/XI—91, dated the 3rd April, 1930, to the local authorities concerning their tender forms for works, some of which are enumerated below :

1. Allahabad Minto Park water supply.
2. Allahabad water supply reorganization completion report.
3. Hardwar sanitary improvements.
4. Hardwar temporary sewer along esplanade to intercept sullage flowing into the Ganges.
5. Orai cleaning of paved tank.
6. Puranpur (Pilibhit) drainage.
7. Tunnas village (Naini Tal) water supply.

STAFF.

The post of the Superintending Engineer was held throughout the year by Mr. G. McC. Hoey, who also acted as Water Works Engineer and Mechanical Adviser to Government in addition to his own duties. The post of his personal assistant was held throughout the year by Mr. H. G. Trivedi, who has also been appointed Secretary, Board of Public Health, from February, 1933.

Mr. F. J. Mallett, who proceeded on leave in May, 1932 has retired from January, 1933. This officer's services received a favourable notice in a special resolution of the Board of Public Health which referred to the great improvement in municipal water supplies which had taken place during his tenure of office. It is regretted that his services are no longer available to the department.

Mr. N. R. Gupta worked as assistant to the Water Works Engineer and Mechanical Adviser to Government.

Mr. F. D. Tunnicliffe held charge of the II Division throughout the year.

Mr. Saise continued as Executive Engineer, I Division, Public Health Department, Meerut, from the beginning of the year to June, 1932, and again from 6th October, 1932 to the end of the year. During his absence on leave from 3rd June to 5th October, 1932 Mr. Puran Mal, *temporary Assistant Engineer held charge of* the division.

Mr. N. D. Chaudhary continued as Executive Engineer, Well Boaring Operations Division, Cawnpore, throughout the year.

Mr. S. B. Mathur, permanent Executive Engineer, remained attached to the I Division, Public Health Department, Meerut, but is still on sick leave.

The conduct and service of one officer was adversely commented upon by the head of the department and a committee was appointed by Government to examine his case.

In addition to the above, four permanent Assistant Engineers of the Public Health Engineering Service, four temporary Assistant Engineers, of which the services of one were terminated from 15th January, 1933, and the post held by him retrenched, nine overseers, and nine temporary subordinates and the requisite number of computors, draftsmen and clerks were employed.

Superintending Engineer inspected all important water works as well as works under construction.

Members of the staff also rendered assistance to Roorkee Engineering College and Lucknow and Allahabad Universities when duties permitted in giving lectures and acting as examiners in engineering subjects.

G. McC. HOEY,
I.S.E., M. INST., C.E.,
Superintending Engineer,
Public Health Department,
United Provinces.

July 1, 1933.

APPENDICES.

APPENDIX

Statement of operations of various water-works

Item number	Particulars	Agra	Allahabad	Benares	Cawnpore	Lucknow	Meerut	Mussoorie	Naini Tal
	Population								
1	By census of 1931 in municipality.	205,487	173,395	201,037	219,189	251,097	91,181	11,040	13,558
2	By census of 1931 in cantonments.	24,277	10,019	4,278	24,566	23,552	45,528	2,017	1,233
3	Inhabitants drawing their supply from mains.	229,764	183,914	205,315	243,755	218,000	91,181	13,057	14,791
	Consumption of water								
4	Metered supplies—								
	(a) Cantonments, million gallons.	143·617	75·240	1·131	7·010	144·480	Nil	5·544	1·284
	(b) Trade, million gallons ..	43·141	25·240	1·685	330·382	117·897	12·095	Nil	0·167
	(c) Domestic (bungalows, etc.), million gallons.	94·007	31·210	33·546	504·148	104·258	4·323	48·294	18·144
	(d) Buildings, million gallons	1·603	10·681	30·598	52·748	67·965	0·299	Nil	0·193
	Total metered supplies, million gallons.	237·573	142·371	66·960	894·288	434·600	17·217	53·838	19·788
5	Unmetered supplies—								
	(a) Domestic (assessment or ferrule), million gallons.	1,063·473	1,038·458	2,012·676	1,658·927	1,302·581	265·319	10·566	30·539
	(b) Municipal purposes (road watering, irrigation and flushing, etc.), million gallons.	175·951	420·541	197·944	380·376	491·423	3·760	14·088	9·997
	(c) Standposts, million gallons	246·561	445·053	503·169	230·878	310·840	199·728	42·263	10·180
	(d) Buildings, million gallons	2·042	19·497	7·123	5·331	0·581	Nil	3·522	0·053
	Total unmetered supplies, million gallons.	1,488·027	1,923·549	2,720·912	2,275·512	2,605·425	469·807	70·439	50·669
6	Total quantity supplied during the year (items 4 and 5), million gallons.	1,775·600	2,068·920	2,787·872	3,169·300	3,040·025	487·024	§124·277	†70·457
7	Daily average supply, million gallons.	4·865	5·668	7·638	8·684	8·329	1·334	0·340	0·193
8	Maximum daily average in any one month, million gallons.	6·037	6·782	8·027	10·719	9·274	1·487	0·434	0·268
9	Consumption per head per day for trade alone, gallons.	0·57	0·42	0·02	3·71	1·43	0·36	Nil	0·03
10	Consumption per head per day for municipal purposes and buildings, gallons.	2·14	6·71	3·15	4·93	7·04	0·12	3·70	1·88
11	Consumption per head per day for domestic purposes, gallons.	18·46	23·69	34·03	26·99	29·69	14·15	22·88	11·14
12	Total consumption per head per day (items 9, 10 and 11), gallons.	21·17	30·82	37·20	35·63	38·21	14·63	26·03	13·05
13	Hours of daily supply ..	8·53	15·00	9·44	16·20	18·50	18·03	24·00	12·83
14	Total hours of pumping during the year.	9,340·00	12,141·75	8,495·91	14,984·00	12,051·15	6,582·50	12,838·25	4,684·17
	Lift of pumps								
15	From river to settling tanks, feet.	48·15	125·00	89·50	35·32	101·08	15·16	Murray 1,811·50 Mackinon 639·00 Bhilaru 1,385·68	H. Z. 1,148·60 L. Z. 451·60 L. Z. 252·60
16	From filtered water pumps to town distribution, feet.	142·00	110·50	92·30	94·10	53·90	131·75		
17	Total lift, feet	190·15	245·50	181·80	129·42	154·98	146·91	Av. 1,317·64	Av. 487·15
18	Total water horse power hours during the year in million.	1·27	1·15	1·30	1·51	0·83	0·32	0·88	0·16

§Includes gravity supply 4·780 million gallons.
† Ditto 10·597 " "

A

in the United Provinces for the year 1932–33.

Dehra Dun	Jhansi	Mirzapur	Muttra	Fyzabad	Hardwar	Unao	Kosi	Fatehpur-Sikri	Aligarh	Golagokarnanath
40,409	64,591	61,184	60,560	59,092	33,287	16,282	7,294	6,098	33,378	5,164
9,721	12,121	Nil	3,439	5,726	Nil	Nil	Nil	Nil	Nil	Nil
40,409	35,961	42,700	53,441	35,000	11,593	13,000	7,294	6,132	35,000	5,164
Nil	1·160	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
0·259	2·053	7·663	1·435	Nil	0·398	Nil	0·437	Nil	Nil	Nil
10·328	0·030	Nil	1·736	11·414†	0·708	0·913	0·311	Nil	Nil	0·143
0·213*	Nil	Nil	0·418	0·668	0·766	Nil	Nil	Nil	Nil	Nil
10·800	3·243	7·668	3·589	12·082	1·867	0·913	0·748	Nil	Nil	0·143
99·200	3·962	202·622	111·572	100·047	45·412	56·636	Included in 5 (c)	Nil	58·693	Nil
	1·786	51·975	22·890	11·340	9·755		0·027	Nil	3·300	0·420
	55·315	80·754	136·060	93·272	28·280		22·629	14·857	49·200	4·408
	Nil	9·598	3·705	1·334	0·559	Nil	0·142	Nil	Nil	Nil
99·200	61·063	344·949	274·227	201·993	84·015	56·636	23·198	14·857	111·253	4·828
110·000	64·306	352·617	277·816	213·975	85·882	57·549	23·946	14·857	111·253	4·971
0·301	0·176	0·966	0·761	0·586	0·235	0·158	0·056	0·041	0·205	0·017
0·435	0·208	1·077	0·833	0·675	0·395	0·174	0·074	0·018	0·412	0·024
0·02	0·16	0·40	0·07	Nil	0·10	Nil	0·16	Nil	Nil	Nil
7·44	0·13	3·95	1·24	1·04	2·63	12·13	0·06	Nil	0·26	0·22
	4·61	18·18	11·49	15·71	17·67		8·77	6·62	8·45	2·42
7·46	4·90	22·62	12·80	16·75	20·40	12·13	8·99	6·62	8·71	2·64
24·00	9·33	19·00	7·50	9·50	12·00	10·00	10·00	7·00	5·50	10·00
Nil	3,390·50	Nil	6,525·33	10,464·32	9,713·00	4,374·50	8,205·00	2,356·00	16,369·25	1,641·00
Gravity supply.	216·61	Gravity supply	D. C. Set 140·00 A. C. set 144·00 Sub Well 131·50	Old Pumps 112·22 New pumps 177·66	177·75	180·00	111·15	210·05	149·25	67·80
Gravity supply.	216·61	Gravity supply	Average 142·12	Average 137·58	177·75	180·00	111·15	210·05	149·25	67·80
Nil	0·07	Nil	0·20	0·15	0·08	0·04	0·01	0·02	0·08	0·002

*For municipal purposes.
†Includes 0·036 million gallons supplied to post office in cantonment.

APPENDIX

Statement of operations of various water-works

Item number	Particulars	Agra	Allahabad	Benares	Cawnpore	Lucknow	Meerut	Mussoorie	Naini Tal
	Supply connexions								
	Unmetered—								
19	Number of connexions made during 1932–33.	165	303	679	617	927	90	8	Nil
20	Total number of connexions..	5,417	7,010	16,516	10,731	12,066	2,034	24	7
	Metered—								
21	Number of house connexions made during 1932–33.	10	12	69	233	5	3	84	20
22	Total number of house connexions.	216	330	186	1,737	426	19	608	377
23	Number of trade connexions made during 1932–33.	Nil	Nil	8	2	12	Nil	Nil	4
24	Total number of trade connexions.	104	45	47	130	102	21	Nil	18
	Annual charges and cost of water supplied								
25	Maintenance charges, Rupees	1,50,270	2,30,188	2,30,645	2,76,538	2,97,356	27,892	83,185	59,303
26	Interest and sinking fund charges. „	63,370	1,46,180	88,090	34,522	1,56,859	Nil	41,640	25,589
27	Total charges .. „	2,13,640	3,76,368	3,18,735	3,11,110	4,54,215	27,892	1,23,825	84,892
28	Cost per 1,000 gallons per 100 feet lift. Annas	0·71	0·72	0·73	1·08	1·01	0·63	0·80	3·08
29	Cost per 1,000 gallons maintenance charges. „	1·35	1·78	1·32	1·40	1·56	0·92	10·58	13·47
30	Cost per 1,000 gallons interest and sinking fund charges. „	0·57	1·13	0·51	0·17	0·83	Nil	5·36	5·81
31	Total charges per 1,000 gallons (items 29 and 30). „	1·92	2·91	1·83	1·57	2·39	0·92	15·94	19·28
	Income from water-works								
32	Unmetered—								
	(a) Water rate recovered (assessment or ferrule) Rupees	1,76,596	3,67,446	2,46,065	4,02,938	3,71,624	26,581	10,860	49,201
	(b) Amount credited to water-works for water used for municipal purposes. „	21,993	36,000	49,485	Nil	72,393	3,348	Nil	11,926
	(c) Buildings and other receipts. „	2,896	16,146	20,230	8,800	(a)34,586	490	1,497	2,896
	Total .. „	2,03,425	4,19,592	3,15,780	4,11,738	4,78,603	30,419	12,357	64,023
33	Metered—								
	(a) Sale of water by meter. „	89,676	82,142	33,550	1,56,818	1,62,822	6,648	78,737	82,016
	(b) Meter rent .. „	2,406	5,262	3,190	16,323	7,485	72	2,785	2,744
	Total .. „	92,082	87,404	36,740	1,73,141	1,70,307	6,715	81,522	84,760
34	Total income (items 32 and 33). „	2,95,507	5,06,996	3,52,520	5,84,879	6,48,910	37,134	93,879	98,783
	Income and working charges								
35	Receipt per 1,000 gallons supplied through meter. Annas	5·12	9·62	8·78	8·10	6·27	6·24	24·23	28·11
36	Receipt per 1,000 gallons supplied through assessment rating. „	2·19	3·49	1·86	2·90	2·94	1·04	2·81	20·22
37	Receipt per 1,000 gallons on total consumption. „	2·66	3·92	2·02	2·95	3·42	1·22	12·09	22·43
38	Profit or loss per 1,000 gallons supplied. „	Profit 0·74	Profit 1·01	Profit 0·19	Profit 1·38	Profit 1·02	Profit 0·30	Loss 8·85	Profit 8·15
39	Profit or loss on year's working. Rupees	„ 81,367	„ 1,30,628	„ 33,785	„ 2,73,769	„ 1,94,695	„ 9,242	„ 29,946	„ 13,891

(a) Includes Rs. 25,000 Government subsidy.

A—(*concluded*)

in the United Provinces for the year 1932–33

Dehra Dun	Jhansi	Mirzapur	Muttra	Fyzabad	Hardwar	Unao	Kosi	Fatehpur-Sikri	Aligarh	Gola-gokaran-nath
Nil	24	80	60	104	19	13	1	Nil	289	1
1	125	2,757	1,924	1,328	219	216	5	Nil	657	1
1	3	Nil	17	8	8	8	3	Nil	Nil	3
55	10	Nil	22	44	19	10	11	Nil	Nil	7
Nil	Nil	Nil	17	Nil	Nil	Nil	Nil	Nil	Nil	Nil
2	2	9	26	Nil	3	Nil	3	Nil	Nil	Nil
9,939	17,373	5,238	64,444	27,847	22,530	10,161	5,155	3,365	29,070	3,120
12,872	Nil	21,788	18,350	11,426	11,424	Nil	Nil	Nil	38,282	Nil
22,811	17,373	27,076	82,794	39,273	33,954	10,161	5,155	3,365	67,352	3,120
Nil	1·99	Nil	2·61	1·51	2·36	2·17	3·09	1·98	2·73	14·31
1·45	4·32	0·24	3·71	2·03	4·20	2·82	3·44	4·16	4·18	10·04
1·87	Nil	0·99	1·06	0·86	2·13	Nil	Nil	Nil	5·51	Nil
3·32	4·32	1·23	4·77	2·54	6·33	2·82	3·44	4·16	9·69	10·04
Nil	17,901	29,134	68,829	40,365	17,872	10,031	7,430	1,020	12,725	Nil
824	1,000	Nil	6,053	2,500	3,963	Nil	Nil	Nil	Nil	50
4,408	360	1,713	2,901	1,581	30,415†	274	195	Nil	1,530	Nil
5,232	19,261	30,847	78,683	44,446	52,250	10,305	7,725	1,020	14,255	50
14,151*	1,976	1,684	469	1,241	1,393	742	89	Nil	Nil	60
34	62	77	118	450	147	13	35	Nil	Nil	72
14,185	2,038	1,761	587	1,691	1,540	755	124	Nil	Nil	132
19,417	21,299	32,608	79,270	46,137	53,790	11,060	7,849	1,020	14,255	182
21·01	10·05	3·67	2·62	2·24	13·20	13·23	2·85	Nil	Nil	14·77
0·84	5·05	1·43	4·59	3·52	9·05	2·01	5·93	4·10	2·05	0·17
2·83	5·20	1·48	4·57	3·45	13·02	3·07	5·24	13·10	2·05	0·88
Loss 0·49	Profit 0·98	Profit 0·45	Loss 0·20	Profit 0·51	Profit 3·69	Profit 0·45	Profit 1·80	Loss 3·06	Loss 7·64	Loss 0·46
,, 3,994	,, 3,923	,, 5,562	,, 3,524	,, 3,864	,, 19,836	,, 599	,, 1,034	,, 2,845	,, 63,097	,, 2,938

*Includes Rs. 495 income for supplying 0·213 million gallons of water for municipal purposes.
† Includes Rs. 30,000 from fair fund.

APPENDIX B

Statement showing total demand, amount recovered, remissions and arrears of various water-works in the United Provinces during the year 1932–33

Water-works stations	Total demand	Total amount recovered	Total amount of remissions	Arrears on 31st March 1933		Remarks
				Total amount	Percentage	
	Rs.	Rs.	Rs.	Rs.		
1. Agra ..	4,81,926	2,95,507	20,642	1,66,599	34·57	Excess collection Rs.322.
2. Allahabad ..	5,57,890	5,06,996	2,874	48,020	8·61	
3. Benares ..	5,11,949	3,52,520	7,865	1,51,564	29·60	
4. Cawnpore ..	7,44,496	5,84,879	16,452	1,43,165	19·23	
5. Lucknow ..	6,57,186	6,48,910	232	8,044	1·22	
6. Meerut ..	44,425	37,134	16	7,275	16·38	
7. Mussoorie ..	1,04,820	93,879	3,613	7,446	7·10	Excess collection Rs.308.
8. Naini Tal ..	1,03,288	98,783	35	4,554	4·41	Excess collection Rs.34.
9. Dehra Dun ..	19,571	19,417	43	111	0·57	
10. Jhansi ..	22,390	21,299	242	849	3·79	
11. Mirzapur ..	50,261	32,608	4,347	13,306	26·47	
12. Muttra ..	93,840	79,270	3,147	11,423	12·17	
13. Fyzabad ..	52,634	46,137	3,400	3,097	5·88	
14. Hardwar ..	53,783	53,790	..	..	..	Excess collection Rs.7.
15. Unao ..	15,395	11,060	549	4,286	26·96	
16. Kosi ..	8,657	7,849	520	358	4·13	Excess collection Rs.60.
17. Fatehpur-Sikri ..	2,697	1,020	83	1,594	59·10	
18. Aligarh ..	14,380	14,255	..	125	0·87	
19. Golagokarannath	207	182	..	25	12·08	
Total ..	35,40,315	28,05,496	64,260	5,71,841	16·15	

APPENDIX C

Statement showing number and size of all connections ; also number and size of metered connections for the year 1932–33.

Name of stations	Size of connections																			Remarks
	1/8"	3/16"	1/4"	3/8"	1/2"	5/8"	3/4"	1"	1¼"	1½"	2"	3"	4"	6"	8"	10"	12"	Unknown connections	Total	
Unmetered supplies																				
Agra	939	..	953	2,774	506	..	158	72	..	14	..	1	..	..	..	..	..	..	5,417	
Allahabad	928	..	1,354	3,113	1,856	60	50	90	..	10	9	..	..	..	..	..	..	..	7,070	
Benares	3,891	..	10,785	996	891	..	..	..	..	..	3	..	..	..	..	..	..	..	16,516	
Cawnpore	..	651	4,841	2,738	1,526	8	401	440	23	93	..	..	..	..	..	..	..	*7	10,731	* T connections.
Lucknow	..	..	..	9,380	1,929	103	167	116	12	2	2	..	..	..	..	..	..	..	13,666	
Meerut	..	..	..	1,480	428	..	21	10	..	..	..	..	..	..	..	..	..	..	2,034	
Mussoorie	..	..	..	..	24	..	..	..	..	..	..	..	..	..	..	..	..	..	24	
Naini Tal	..	..	..	..	1	..	2	1	1	..	2	..	..	..	..	..	..	..	7	
Dehra Dun	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	1	
Jhansi	..	..	11	..	101	..	6	2	..	1	4	..	..	..	..	..	..	..	125	
Mirzapur	20	..	376	1,573	492	6	174	63	52	..	..	1	..	..	..	..	..	..	2,757	
Muttra	598	..	1,132	80	105	..	2	..	..	..	..	..	..	..	..	..	..	..	1,924	
Fyzabad	980	..	223	69	56	..	..	..	..	..	..	..	..	..	..	..	..	..	1,328	
Hardwar	82	..	69	9	50	..	..	..	..	..	..	..	..	..	..	..	..	..	210	
Unao	99	..	81	26	10	..	..	..	..	..	..	..	..	..	..	..	..	..	216	
Kosi	..	..	..	5	..	..	..	..	..	..	..	..	..	..	..	..	..	..	5	
Fatehpur-Sikri	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
Aligarh	894	244	72	8	..	..	..	..	..	..	..	..	..	..	..	..	..	..	657	
Golagokarannath	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	1	
Total ..	7,871	895	19,853	22,301	7,421	182	984	704	93	120	20	2	..	..	..	..	..	7	61,038	
Metered supplies																				
Agra	6	..	20	70	86	..	74	32	..	18	2	4	..	5	2	..	1	..	320	
Allahabad	..	..	..	1	137	41	84	55	..	11	20	9	14	2	1	..	..	..	375	
Benares	..	..	..	..	150	..	24	20	11	9	5	4	1	..	..	..	..	..	233	
Cawnpore	..	..	..	1	1,017	..	223	374	9	159	51	36	10	..	..	..	..	..	1,876	
Lucknow	..	..	..	..	229	..	110	119	..	42	15	6	5	..	1	..	..	†1	528	† 15" connections.
Meerut	..	..	..	..	31	..	2	5	..	..	..	2	..	..	..	..	..	..	40	
Mussoorie	..	..	..	..	549	..	51	6	..	..	..	2	..	..	..	..	..	..	608	
Naini Tal	..	..	..	..	128	240	18	4	..	1	..	..	..	..	..	..	..	..	399	
Dehra Dun	..	..	..	..	37	..	4	15	..	1	..	..	..	..	..	..	..	..	57	
Jhansi	..	..	..	..	..	..	1	5	..	2	4	..	..	..	..	..	..	..	12	
Mirzapur	..	..	..	..	4	..	4	..	..	..	..	1	..	..	..	..	..	..	9	
Muttra	..	..	..	..	40	..	1	1	..	2	1	..	..	..	..	..	..	..	45	
Fyzabad	..	..	..	..	21	..	13	11	..	..	..	..	..	..	..	..	..	..	44	
Hardwar	..	..	4	1	15	..	1	1	..	..	..	..	..	..	..	..	..	..	22	
Unao	..	..	..	6	3	..	1	..	..	..	..	..	..	..	..	..	..	..	10	
Kosi	..	..	..	..	11	..	..	3	..	..	..	..	..	..	..	..	..	..	14	
Fatehpur-Sikri	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
Aligarh	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
Golagokarannath	..	..	..	..	7	..	..	..	..	..	..	..	..	..	..	..	..	..	7	
Total ..	6	..	24	79	2,403	290	615	660	20	256	98	64	50	7	4	..	1	1	4,508	

APPEN

Annual maintenance accounts of

Particulars	Agra	Allahabad	Benares	Cawnpore	Lucknow	Meerut	Mussoorie
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
I.—Establishment—							
(a) Pumping ..	17,994	20,412	23,406			7,592	10,560
(b) Workshops ..	4,5[illegible]9	5,051	6,172			..	..
(c) Settling tanks and filters.	746	6,232	364			..	..
(d) Inlet chambers, well and grounds, etc.	..	327	..	56,664	43,753	.. 4,036	.. 4,087
(e) Distribution ..	9,786	12,608	13,898				
(f) Clerical staff ..	1,525	4,495	3,426			1,068	..
(g) Menial „ ..	3,303	446	1,321			1,128	388
(h) Office contingencies	1,169	391	1,050	188	2,179	1,140	1,743
(i) Rent	454	930	535	562	785	60	
II.—Fuel, lubricants and stores—	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(a) Fuel (coal, fuel oil or electric energy).	70,649	1,55,255	1,53,028	1,15,535	1,85,829	..	45,003
(b) Lubricating oil ..	8,211	1,631	1,411	358	991	169	2,398
(c) Waste	375	347	289	201		228	
(d) Packing ..	..	195	73	..	6,345	312	..
(e) Petty stores ..	6,3[illegible]7	1,940	2,976	2,957		886	2,014
III.—Intake—							
(a) Training river ..	1,042	..	..	..	..	..	..
(b) Cleaning channels and wells.	4,235	..	..	..	272	80	..
IV.—Settling tanks and filters—							
(a) Cleaning settling tanks and wells.	362	178	3,395	..	4,012	100	..
(b) Cleaning and renewing filter-beds.	3,327	971	3,496	..	3,230	1,085	..
(c) Purchase of sand ..	3,279	2,643	2,433	1,874	14,369	..	..
(d) Purchase of alluminoferric.	2,617	3,368	4,883	9,157	22,432	1,925	..
V.—Distribution—							
(a) Pipes and fittings	1,535	4,000	1,373	6,821	4,206	499	1,103
(b) Meters	..	1,370	..	1,458	581	..	2,541
(c) Standposts or hydrants.	62	..	..	..	..	..	..
VI.—Repairs—							
(a) To tanks ..	961	268	71	10	..	..	2,176
(b) To buildings and grounds.	736	483	2,343	246	1,137	495	2,563
(c) To machinery ..	4,932	780	2,919	4,132	4,098	1,164	1,570
(d) To rising main ..	..	..	..	..	..	..	5,254
(e) To tools and plants	..	26	..	..	..	..	..
VII.—Water analysis—	..	836	1,223	1,385	2,237	955	850
VIII.—Cost of water—							
Canal department dues ..	1,050	..	..	75,090	..	4,970	..
Total ..	1,50,270	2,30,188	2,30,645	2,76,588	2,97,356	27,992	82,185
Interest and sinking fund charges.	63,370	1,46,180	88,090	34,522	1,56,859	..	41,640
GRAND TOTAL ..	2,13,640	3,76,368	3,18,735	3,11,110	4,54,215	27,892	1,23,825

(1) Rupees 10,742 less on consumption. Electrical charges for Maithan and Chhilli Int Rs.1,442 and for raw water Rs.16,726. Cost of fuel oil Rs.10,210.
(2) Rupees 307 less on consumption. Cost of coal for municipal purposes, Rs.815 and fuel oil for Daraganj tube-well Rs.1,546.
(3) Rupees 3,984 in excess of consumption. Coal worth Rs.4,792 was used for workshop, tube-well and municipal purposes.
(4) Coal worth Rs.1,591 used for workshop and municipal purposes.
(5) Rupees 2,137 in excess of consumption. Cost of coal for municipal purposes and workshop, etc. Rs.352.
(6) Pumping done by turbine, no fuel was purchased during the year. Last year's stock was used for banking engines and workshop.
(7) Electrical charges. Includes Rs.721 cost of fuel oil.

DIX D

water-works during the year 1932–33

Naini Tal	Dehra Dun	Jhansi	Mirzapur	Muttra	Fyzabad	Hardwar	Unao	Kosi	Fatehpur-Sikri	Aligarh	Gola-gokarnanath
Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
	..	2,759		9,053	7,739	2,990	1,521	1,183	1,234	3,017	
	..	..		1,439	1,795	1,580	..	..	..	..	
	..	..	2,800	..	..	..	..	..	..	..	
6,592	..	..		..	..	..	..	..	..	..	1,967
	..	..	..	2,254	3,040	2,486	564	600	193	743	
	4,498	..	282	180	792	503	..	540	..	..	
	3,398	..	680	354	1,495	550	363	354	305	353	
423	89	307	285	384	515	516	14	96	93	13	
..	..	..	..	..	..	..	..	..	72	..	
(8)		(9)		(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
36,241	..	7,637	..	48,199	7,952	12,612	4,176	1,303	774	23,394	669
585	..	87	..	459	2,287	100	2,272	537	287	..	159
105	..	12	..	21	..	90	196	27	37	..	
360	..	66	..	107	..	40	..	..	..	..	..
951	..	155	..	97	215	..	139	54	60	26	..
..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	3	..	..
..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	217	..	..	..	..	..	..	..	..
2,921	1,606	*179	719	..	5	200	3	164	..	57	..
..	220	226	..	..	..	..	..	..	..	..	..
328	..	..	..	321	12	206	3	..	64	200	..
824	..	..	75	..	..	..	..	..	..	725	..
578	..	..	..	325	248	350	37	20	8	50	40
6,492	..	346	..	975	1,460	600	516	207	444	48	310
..	..	25	..	..	..	..	..	..	8	..	15
1,297	..	67	162	276	..	100	2	70	111	..	20
1,606	130	74	118	..	292	..	355	..	66	442	..
..	..	5,988	..	..	..	..	..	..	..	..	..
59,303	9,939	17,373	5,258	54,444	27,947	22,530	§10,161	5,155	3,865	29,070	3,120
25,589	12,872	..	21,798	18,350	11,426	11,424	..	..	..	38,282	..
84,892	22,811	17,373	27,076	82,794	39,273	33,954	10,161	5,155	3,865	67,352	3,120

(8) Electrical charges.
(9) Rupees 664 in excess of consumption.
(10) Electrical charges. Rs.4,401 in excess of consumption. Fuel oil worth Rs.1,895 was used for pumping water by Diesel engines and municipal purposes.
(11) Rupees 508 in excess of consumption.
(12) Electrical charges.
(13) Rupees 595 in excess of consumption.
(14) Rupees 9 in excess of consumption.
(15) Rupees 54 in excess of consumption.
(16) Electrical charges. Rs.1,272 less on consumption.
(17) Rupees 98 less on consumption.
*Includes Rs.37 repairs to wells.
§Does not include Rs. 313 spent in repairing and cleaning public wells.

APPENDIX E

Statement showing costs of subsequent extensions and improvements, chargeable to capital on the various water-works in the United Provinces for the year ending 31st March 1933.

Water-works stations	Initial capital cost	Cost of subsequent extension	Expenditure during the year 1932-33	Total
	Rs.	Rs.	Rs.	Rs.
Agra	11,70,761	24,03,058	15,280	35,94,099
Allahabad	16,24,061	28,68,797	45,174	45,38,032
Benares	25,61,881	18,40,465	36,801	44,39,147
Cawnpore	14,44,570	22,18,148	13,899	36,76,617
Lucknow	15,15,736	49,49,281	41,056	65,06,073
Meerut	7,51,710	71,085	1,307	8,24,102
Mussoorie	4,79,754	8,07,853	6,892	12,94,499
Naini Tal	2,47,000	8,07,350	2,942	10,57,292
Dehra Dun	97,241	3,81,324	5,917	4,84,482
Jhansi	96,556	1,04,504	9,789	2,10,849
Mirzapur	5,98,492	1,42,254	2,251	7,42,997
Muttra	5,17,288	1,12,381	26,170	6,55,789
Fyzabad	9,48,862	82,938	8,137	10,39,797
Hardwar	1,96,919	2,94,581	5,788	4,97,288
Unao	1,18,664	57,633	15,343	1,91,640
Kosi	70,322	1,052	956	72,330
Fatehpur-Sikri	52,034	6,073	8,758	67,465
Aligarh	5,70,992	18,814	3,855	5,93,661
Golagoharannath	99,291	9,382	374	1,09,047
Grand total ..	1,31,61,934	1,71,82,473	2,50,689	3,05,95,096

APPENDIX F

Statement showing filter area out of operation, rate of filtration, and results of water analyses of the water-works in the United Provinces during the year 1932-33.

Water-works	Sand filter area out of operation per million gallons pumped sq. feet.	Filtration rate in gallons per square foot per day of sand filter			Water from supply mains						
					Chemical analyses			Bacteriological analyses			
		Maximum	Minimum	Average	Good	Bad	Total	Number of samples tested	Number of samples containing over 100 colonies	Average number of microbes per c. c.	Percentage (on total) of samples over 100 per c. c.
Agra	4,644	84·00 1,937*	25·00 1,614*	31·49 1,855*	2	6	8	1,809	538	77·22	29·74
Allahabad ..	7,171	50·00 2,300*	7·00 1,300*	26·27 1,851*	..	3	3	503	..	29·20	..
Benares ..	4,915	50·00	25·00	44·65	3	..	3	455	39	72·22	8·57
Cawnpore ..	663	68·00	17·00	47·73	2	2	4	720	..	25·29	..
Lucknow ..	6,012	56·20 1,945*	6·20 103*	33·17 1,457*	3	..	3	204	..	24·17	..
Meerut ..	4,312	31·00	25·00	30·56	2	..	2	244	..	36·04	..
Mussoorie ..	Water supply from deep springs and is not filtered.				4	1	5	514	11	43·36	9·67
Naini Tal ..					3	..	3	103	10	55·93	9·26
Dehra Dun ..					11	8	19	140	37	59·26	26·42
Jhansi ..	Unfiltered supply				..	1	1	8	7	291·20	87·50
Mirzapur ..	Gravitation supply				1	1	2	56	6	29·34	10·71
Muttra ..	Tube well supply				3	..	3	107	18	17·09	16·82
Fyzabad ..					..	..	..	281	..	14·54	..
Hardwar ..					11	1	12	298	54	36·73	18·12
Unao					2	..	2	29	2	34·68	6·89
Kosi					1	..	1	23	2	10·48	8·69
Fatehpur-Sikri ..					1	..	1	2	..	56·50	..
Aligarh ..					..	8	8	102	..	25·84	..
Golagokarannath ..					Information not available.						

* Paterson Filters.

APPENDIX G

Details of pumps, filters, tanks, reservoirs, rising mains, and other details of the water-works of the United Provinces for 1893-95

Particulars	Agra	Allahabad	Benares	Cawnpore	Lucknow	Meerut	Mussoorie	Naini Tal	Dehra Dun	Bareli	Mirzapur	Mathura	Fyzabad	Hardwar	Unao	Rae	Fatehgarh-Sikri	Aligarh	Shahjahanpur
Levels:																			
Filtered Station L.	576·20'	1250·00'	254·00'	402·00'	367·50'	739·50'	Murray Spring 5,494'	"	"	742·70'	"	880·00'	Old station 338·37' New station 320·31'	841·00'	417·25'	612·40'	607·00'	"	520·00'
Filtered Station L.	605·20'	321·25'	253·00'	410·00'	305·50'	735·50'	Bhikam Spring 5,700'	"	"	"	"	"	"	"	"	"	"	"	"
Highest water level during the year, L.	635·00'	374·00'	261·55'	373·50'	348·40'	"	Machinon Spring 6,000' Landour Spring 6,000'	"	"	"	"	"	"	"	"	"	542·65'	"	492·00'
Lowest water level during the year, L.	481·00'	324·50'	193·04'	358·00'	342·50'	"	"	"	"	"	"	"	"	"	"	"	397·65'	"	435·67'
Number of plant:																			
Filtered Station	2 Diesel sets .. 1 L. D. Worthington. 2 Mather and Platt motor driven vertical spindle centrifugal pump.	2 Mather and Platt "Lowvane" centrifugal pumps direct driven by A. C. motors.	1 H. D. Worthington (Standby). 2 Geared sets, (Standby). 3 Worthington vertical spindle centrifugal pumps direct driven by G. E. C., A. C. motors.	1 Triple expansion rotary, (Standby). 2 Vertical spindle centrifugal pumps direct driven by A. C. motors at river side. 3 sets of centrifugal pumps direct driven by electric motor at unfiltered station Bamjhane.	2 Mather and Platt motor driven "Medivane" centrifugal pumps.	2 Water power turbines. 1 Semi-portable engine.	Murray Spring: Two sets electrically driven geared three ram pumps single reduction gearing. Bhikam Spring: Two sets as above. Machinon Spring: Two pumps as above but with double reduction gearing. One semi Diesel oil engine. Landour: Two sets of Worthington-Simpson three throw single plunger power pumps driven by Metropolitan-Vickers induction motors.	Lake Station: 2 motor driven Worthington centrifugal pump. Main Station: Four Mather and Platt motor driven pumps. Two triple ram geared pumps. One spring pump driven by A. C. motor.	Gravitation supply.	2 Worthington compound steam engine and pump.	Gravitation supply.	2 Two cylinder Mirrlees Diesel engines. D. C. generator motor driven Mather and Platt centrifugal pumps. One set converted to A. C. motor taking energy from the Electric Supply Company. One A. C. motor driving Sullivan air compressor for air lift pump and one Worthington centrifugal pump.	2 Two cylinder Mirrlees engines and motor-driven Mather and Platt centrifugal pumps. One single stage double acting Sullivan air compressor-motor belt driven. One horizontal direct driven electric-motor centrifugal pump.	3 Mather and Platt centrifugal pumps driven by A. C. motors.	Two 50 B. H. P. Tangye oil engine. 2 Sullivan air compressor. 3 Air lift pumps in tube-wells and two 6" Worthington centrifugal pumps.	One 16 B. H. P. Tangye crude oil engine. One single stage double acting belt driven Sullivan air compressor. One standard Sullivan air lift pump in tube well. One belt driven Worthington Simpson two stage centrifugal pumps.	One 15 B. H. P. Tangye crude oil engine. One Sullivan air lift pump in tube-well. One single stage double acting Sullivan horizontal air compressor. One Duplex reciprocating pump.	High Zone Two Hasland Engineering horizontal centrifugal pumps direct driven by A. C. motors. Low Zone Four Hasland Engineering Electric vertical pumps direct driven by A. C. motors.	Two sets of Worthington Simpson three stage vertical turbine pumps each driven by Marshalls two-stroke crude oil engines of belt transmission and gears.
Moved Station ..	2 Hallis and Riccom. 1 H. D. Worthington. 2 beams. 2 motor driven, working Simpson centrifugal pumps at Bhikham and Chilli Int.	2 Mather and Platt "Lowvane" centrifugal pumps direct driven by A. C. motors. 2 Beams (Standby).	4 horizontal centrifugal pumps direct, driven by G. E. C., A. C. motors. 2 pairs of compound beams (Standby).	2 L. D. Worthington. (Standby). 1 H. D. Worthington. (Standby). 4 Sets of centrifugal pumps direct driven by A. C. motors.	2 Mather and Platt "Medivane" centrifugal pumps driven by A. C. motors.	2 Water power turbines.	"	"	"	"	"	"	"	"	"	"	"	"	"
Capacity of pumps: Filtered station G. P. M.	Diesel sets 3,000 each. L. D. Worthington 1,000. Mather and Platt centrifugal pump 3,300 each.	Motor pumps 3,000 each.	H. D. Worthington 3,333. Diesel 3,000 each. Motor pumps 3,300 each.	Triple expansion 3,125. Motor pumps River side 3,000 each. Bamjhane 3,000 each.	Motor pumps 3,300 each.	1,200 each ..	Murray Spring 183 Bhikam Spring 136 Machinon Spring 88 Landour Spring 50	Lake side pump 200 each. Main— H. Z. 435 each. L. Z. 375 each. L. Z. 810 each. Spring 50	"	375 each ..	"	4,000 each .. 500	300 each .. 300 each	300 each ..	50 each	150	300 each	H. Z. 300 each. L. Z. 300	"	200
Moved station G. P. M.	Belle 2,000 each. H. D. Worthington 2,000. Beams 2,000 each. Worthington. 500 each.	Electric pumps 3,000 each. Beams 2,100 each	Beams 1,500 each 2 motor-driven centrifugal pumps 1—3,000 each. 1—4,500.	H. D. Worthington 4,500. L. D. Worthington. 3,150 each. Motor pumps 3,300 each.	3 motor pumps 3,000 each.	1,100 each ..	"	"	"	"	"	"	"	"	"	"	"	"	"

Item nos.	Particulars	Agra	Allahabad	Benares	Cawnpore	Lucknow
6	Number of:					
	(a) Rising mains..	Three ..	Two ..	Two ..	Two ..	Two .. ..
	(b) Loading mains	Thirteen ..	Fourteen ..	Three ..	Six ..	One .. ..
	(c) Distribution mains.	Not supplied ..	Eleven ..	One ..	Twelve ..	Eighteen ..
7	Length and size of:					
	(a) Rising mains	1. 10,400 ft. 28″ 2. 7,900 „ 18″ 3. 10,450 „ 8″	1. 3,580 ft. 20″ 2. 3,580 „ 20″	1. 4,699 ft. 24″ (old). 2. 4,065 „ 24″ (new).	1. 3,690 ft. 20″ 2. 3,690 „ 20″	1. 15,840 ft. 27″ 2. 17,580 „ 20″
	(b) Loading mains	1. 4,000 ft. 18″ 2. 2,650 „ 18″ 3. 8,900 „ 18″ 4. 975 „ 15″ 5. 3,650 „ 12″ 6. 700 „ 12″ 7. 1,800 „ 12″ 8 3,200 „ 12″ 9. 900 „ 10″ 10. 2,650 „ 10″ 11. 1,950 „ 9″ 12. 1,750 „ 8″ 13. 1,400 „ 7″	1. 930 ft. 30″ 2. 2,541 „ 25″ 3. 2,310 „ 20″ 4. 13,208 „ 16″ 5. 4,323 „ 15″ 6. 5,965 „ 14″ 7. 1,980 „ 12″ 8. 1,999 „ 10″ 9. 2,030 „ 9″ 10. 4,488 „ 8″ 11. 6,585 „ 7″ 12. 3,432 „ 6″ 13. 3,400 „ 5″ 14. 4,918 „ 4″	1. 16,896 ft. 30″ to 8″. 2. 21,648 „ 30″ to 6″. 3. 2,217 „ 15″	1. 7,200 ft. 28″ 2. 1,575 „ 26″ 3. 850 „ 25″ 4. 4,450 „ 20″ 5. 1,650 „ 18″ 6. 5,800 „ 16″	1. 1,430 ft. 30″
	(c) Distribution mains.	Not supplied ..	1. 7,410 ft. 14″ 2. 6,881 „ 12″ 3. 1,931 „ 10″ 4. 2,572 „ 9″ 5. 14,513 „ 8″ 6. 10,375 „ 7″ 7. 24,375 „ 6″ 8. 14,124 „ 5″ 9. 96,772 „ 4″ 10. 60,660 „ 3″ 11. 13,325 „ 2″ *Note.*—Rider is included in the distribution mains.	1. 330,158 ft. 18″ to 3″.	1. 600 ft. 15″ 2. 825 „ 14″ 3. 2,200 „ 12″ 4. 2,100 „ 11″ 5. 5,436 „ 10″ 6. 8,675 „ 9″ 7. 14,025 „ 8″ 8. 10,219 „ 7″ 9. 17,300 „ 6″ 10. 43,575 „ 5″ 11. 45,650 „ 4″ 12. 77,467 „ 3″	1. 1,200 ft. 21 2. 3,100 „ 20 3. 8,917 „ 18 4. 3,411 „ 16 5. 4,703 „ 15 6. 2,677 „ 13 7. 7,026 „ 12 8. 2,030 „ 11 9. 4,190 „ 10 10. 17,657 „ 9 11. 12,978 „ 8 12. 15,904 „ 7 13. 18,069 „ 6 14. 31,818 „ 5 15. 63,168 „ 4 16. 150,077 „ 3 17. 2,350 „ 2 18. 290 „ 1½
8	Number of settling tanks.	Five ..	Three ..	Three ..	Five ..	Three ..
9	Size of settling tanks	266′ × 151′ × 16′ each.	Top 349′ × 290′ Bottom 296′ × 100′. Height 16·75′. each	Nos. 1 and 3—409·5′×225·0′ × 18′ each. No. 2—409·5′ × 258·3′ × 18′.	Three——349·5′ × 249·5′ × 15′ each. Two—306·5′ × 334′ × 8′ each.	240′ × 290′ × 16′ each.
10	Capacity of settling tanks. Gallons.	2,200,000 each ..	Nos. 1 and 3—4,400,620 each. No. 2—4,455,626.	Nos. 1 and 3—8,640,756 each. No. 2—8,722,146.	Three—7,840,460 each. Two—15,000,000 each.	7,000,000 each ..
11	Number of:					
	(a) Slow sand filters	Seven ..	Six ..	Ten ..	Nine .. Twelve Pusch Chabal.	Seven .. ..
	(b) Paterson filters.	Two ..	Five ..	..	..	Ten .. ..
	(c) Mechanical filters.	Two ..	..	..	..	..
12	Size of:					
	(a) Slow sand filters	200′ × 100′ each	200′ × 100′ each	200′ × 100′ each	200′ × 100′ each. Pusch Chabal 156′ × 28′ each.	200′ × 100′ × 7 each.
	(b) Paterson filters	18′ × 14½′ × depth not known each.	23′ × 18′ × 10′ each.	..	..	23′ × 18′ × 10 each.
	(c) Mechanical filters.	12′ dia × depth each.	..	..	..	..

APPENDIX G—(*continued*)

Details of pumps, filters, tanks, reservoirs, rising mains, and other details of the water-works of the United Provinces for 1892-93.

Item nos.	Particulars	Agra	Allahabad	Benares	Cawnpore	Lucknow	Meerut	Moradabad	Naini Tal	Dehra Dun	Jhansi	Mirzapur	Mathura	Pratabgarh	Hardwar	Unao	Kasganj	Futehpur-Sikri	Aligarh	Gola-Gokaran-nath
6	Number of: (a) Rising mains.. (b) Loading mains (c) Distribution mains.	Three .. Thirteen .. Not supplied ..	Two .. Fourteen .. Eleven ..	Two .. Three .. One ..	Two .. Six .. Twelve ..	Two .. One .. Eighteen ..	Two .. Not supplied .. Ten ..	Four .. Seven .. Five ..	Six .. Six .. Three ..	Not supplied .. Six .. Eleven ..	One .. Two .. Fourteen ..	One .. Eight .. Five ..	One .. Three .. Fourteen ..	One .. One .. Eleven ..	One .. One .. Three ..	Two .. Nil .. Three ..	One .. One .. Four ..	One .. One .. Four ..	Three .. Two. Eight.	Two.
7	Length and size of: (a) Rising mains	1. 10,400 ft. 35" 2. 7,300 „ 18" 3. 10,450 „ 8"	1. 5,560 ft. 20" 2. 5,360 „ 20"	1. 4,600 ft. 24" (old). 2. 4,055 „ 24" (new).	1. 8,000 ft. 20" 2. 8,050 „ 20"	1. 15,640 ft. 27" 2. 17,380 „ 30"	1. 33,320 ft. 15" 2. 8,600 „ 12"	1. 5,740 ft. 8" 2. 3,165 „ 4" 3. 1,450 „ 3½" 4. 5,200 „ 3"	1. 1,210 ft. 6" 2. 9,855 „ 5" 3. 1,795 „ 5" 4. 4,910 „ 3" 5. 3,484 „ 4" 6. 3,494 „ 3½"	Not supplied ..	1. 12,973 ft. 5"	1. 30,251 ft. 18"	1. 4,317 ft. 12"	1. 7,067 ft. 14"	One connected with: *698 ft. 15" 491 „ 12" 858 „ 10" 877 „ 8"	1. 1,630 ft. 6" 2. 810 „ 5"	1. 9,520 ft. 6"	1. 9,385 ft. 5"	1. 9,256 ft. 16" 2. 1,000 „ 7" 3. 165 „ 8"	..
	(b) Loading mains	1. 4,000 ft. 18" 2. 9,650 „ 18" 3. 8,000 „ 18" 4. 975 „ 15" 5. 9,650 „ 12" 6. 700 „ 12" 7. 1,800 „ 12" 8. 8,300 „ 12" 9. 600 „ 10" 10. 3,050 „ 10" 11. 1,050 „ 6" 12. 1,760 „ 8" 13. 1,910 „ 7" 14. 4,915 „ 6"	1. 950 ft. 30" 2. 9,541 „ 25" 3. 2,910 „ 20" 4. 10,833 „ 16" 5. 4,839 „ 15" 6. 5,955 „ 14" 7. 1,980 „ 12" 8. 1,090 „ 10" 9. 9,060 „ 8" 10. 4,858 „ 8" 11. 6,595 „ 7" 12. 8,485 „ 6" 13. 3,470 „ 6" 14. 4,915 „ 4"	1. 16,958 ft. 20" to 8". 2. 21,682 „ 20" to 6". 3. 2,017 „ 15"	1. 7,930 ft. 28" 2. 1,375 „ 18" 3. 850 „ 15" 4. 4,450 „ 20" 5. 1,050 „ 18" 6. 5,300 „ 16"	1. 1,450 ft. 30"	Not supplied ..	1. 7,650 ft. 4½" 2. 3,155 „ 4" 3. 3,950 „ 3½" 4. 9,600 „ 3" 5. 3,300 „ 2½" 6. 7,145 „ 3" 7. 24,030 „ 1½"	1. 5,260 ft. 5" 2. 5,920 „ 3" 3. 50,591 „ 3½" 4. 12,079 „ 3" 5. 16,884 „ 1½" 6. 6,050 „ 1½"	1. 7,970 ft. 6" 2. 17,407 „ 5" 3. 3,003 „ 4" 4. 68,900 „ 3" 5. 20,795 „ 2½" 6. 16,816 „ 2"	1. 633 ft. 10" 2. 49 „ 10"	1. 8,115 ft. 16" 2. 2,858 „ 15" 3. 1,803 „ 12" 4. 1,091 „ 10" 5. 2,116 „ 6" 6. 3,702 „ 8" 7. 1,946 „ 6" 8. 1,090 „ 4"	1. 94 ft. 18" 2. 1,155 „ 12" 3. 600 „ 12"	1. 50 ft. 12"	One connected with: * 960 ft. 15" 6,924 „ 12" 6,320 „ 10" 3,248 „ 8" 4,834 „ 6" 1,143 „ 4" 910 „ 3"	Nil ..	1. 195 ft. 7"	1. 3,201 ft. 3"	1. 6,318 ft. 20" to 9" 2. 3,009 „ 16" to 7"	1. 632 ft. 5". 2. Connected with 433 ft. 5", 2,080 ft. 4".
	(c) Distribution mains.	Not supplied ..	1. 7,410 ft. 14" 2. 6,981 „ 12" 3. 1,761 „ 10" 4. 3,073 „ 9" 5. 14,213 „ 8" 6. 10,375 „ 7" 7. 21,272 „ 6" 8. 14,124 „ 5" 9. 36,773 „ 4" 10. 60,820 „ 3" 11. 13,226 „ 2" Note.—Rider is included in the distribution mains.	1. 800,536 ft. 18" to 3".	1. 600 ft. 15" 2. 856 „ 14" 3. 2,620 „ 12" 4. 2,100 „ 11" 5. 5,466 „ 10" 6. 8,076 „ 9" 7. 14,015 „ 8" 8. 14,013 „ 7" 9. 17,300 „ 6" 10. 43,575 „ 5" 11. 54,650 „ 4" 12. 77,457 „ 3"	1. 1,200 ft. 21" 2. 3,100 „ 20" 3. 2,017 „ 18" 4. 3,411 „ 16" 5. 4,720 „ 15" 6. 2,077 „ 15" 7. 7,038 „ 12" 8. 2,080 „ 12" 9. 4,120 „ 10" 10. 17,537 „ 9" 11. 15,075 „ 8" 12. 15,604 „ 7" 13. 18,069 „ 6" 14. 81,813 „ 5" 15. 68,168 „ 4" 16. 150,077 „ 3" 17. 3,950 „ 2" 18. 200 „ 1½"	1. 211 ft. 11" 2. 66 „ 10" 3. 1,017 „ 7" 4. 701 „ 5" 5. 1,850 „ 3" 6. 8,799 „ 4" 7. 10,808 „ 3" 8. 5,514 „ 2" 9. 720 „ 1" 10. 541 „ 3"	1. 2,350 ft. 24" 2. 14,385 „ 3" 3. 4,450 „ 14" 4. 10,075 „ 1" 5. 6,600 „ 2"	1. 1,905 ft. 12" 2. 26,195 „ 1" 3. 32,704 „ 2"	1. 4,620 ft. 5" 2. 10,953 „ 4" 3. 18,768 „ 3" 4. 10,753 „ 2½" 5. 10,811 „ 2" 6. 4,402 „ 1½" 7. 7,920 „ 1½" 8. 3,760 „ 1½" 9. 16,723 „ 1" 10. 3,455 „ 2" 11. 968 „ 1"	1. 2,570 ft. 9" 2. 1,980 „ 6" 3. 9,075 „ 5" 4. 2,550 „ 4" 5. 7,410 „ 4" 6. 9,380 „ 4" 7. 1,995 „ 4" 8. 853 „ 3" 9. 16 „ 2" 10. 16 „ 2" 11. 16 „ 2" 12. 19 „ 2" 13. 16 „ 2" 14. 16 „ 2"	1. 357 ft. 7" 2. 1,286 „ 6" 3. 9,007 „ 5" 4. 9,038 „ 4" 5. 50,078 „ 3"	1. 660 ft. 12" 2. 1,155 „ 8" 3. 600 „ 8" 4. 2,540 „ 7" 5. 9,080 „ 6" 6. 7,705 „ 5" 7. 14,025 „ 4" 8. 49,444 „ 3" 9. 698 „ 2½" 10. 9,093 „ 2" 11. 190 „ 1½" 12. 14,971 „ 1" 13. 3,408 „ 2" 14. 9,746 „ 1"	1. 49 ft. 15" 2. 138 „ 14" 3. 62 „ 12" 4. 1,175 „ 10" 5. 3,956 „ 8" 6. 1,650 „ 6" 7. 7,136 „ 7" 8. 7,850 „ 6" 9. 7,098 „ 5" 10. 16,560 „ 4" 11. 38,816 „ 3"	1. 2,600 ft. 6" 2. 6,861 „ 4" 3. 3,436 „ 3" (Note.—This is one length of 15" pipe and common for rising and leading.	1. 581 ft. 6" 2. 1,280 „ 5" 3. 32,011 „ 3"	1. 1,100 ft. 5" 2. 1,300 „ 4" 3. 3,750 „ 3" 4. 1,300 „ 2½"	1. 491 ft. 12" 2. 464 „ 12" 3. 983 „ 7" 4. 1,016 „ 2"	1. 75 ft. 9" 2. 592 „ 8" 3. 6,164 „ 7" 4. 8,843 „ 6" 5. 42,007 „ 5" 6. 20,144 „ 4" 7. 10,738 „ 3" 8. 9,597 „ 2½"	..
8	Number of settling tanks.	Five ..	Three ..	Three ..	Five ..	Three ..	Three ..	..	..	..	..	..	..	..	..	..	..	..	..	..
9	Size of settling tanks	250' X 150' X 10' each.	Top 245' X 80' Bottom 236' X 70'. Height 10'-9'. each	Nos. 1 and 3—405'-5' X 385'-0' X 16' each. No. 2—402'-5' X 358'-0' X 12'.	Three—345'-5' X 245'-5' X 15' each. Two—300'-2' X 234' X 8' each.	240' X 100' X 12'-9' each.	100' X 50'-8' X 11' each.	..	..	..	..	..	..	..	..	..	..	..	..	..
10	Capacity of settling tanks. Gallons.	1,500,000 each ..	Nos. 1 and 3—4,650,000 each. No. 2—1,860,000.	Nos. 1 and 3—8,040,768 each. No. 2—4,720,128.	Three—7,240,000 each. Two—1,800,000 each.	7,000,000 each ..	135,000 each ..	..	..	..	..	..	..	..	..	..	..	..	..	..
11	Number of: (a) Slow sand filters	Seven ..	Six ..	Ten ..	Nine. Twelve (Pond Chabil).	Seven ..	Four ..	..	Cartridge filter	..	..	..	..	..	..	..	..	..	..	..
	(b) Pressure filters. (c) Mechanical filters.	Two ..	Five ..	..	..	Ten ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
12	Size of: (a) Slow sand filters	300' X 100' each	300' X 100' each	300' X 100' each	300' X 100' each. Pond Chabil 150' X 90' each.	300' X 100' X 7' each.	150' X 100' each	..	..	..	..	..	..	..	..	..	..	..	..	..
	(b) Pressure filters	18' X 14' X 4½' each and 4 feet on.	16' X 16' X 10' each.	..	..	10' X 15' X 10' each.	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	(c) Mechanical filters.	18' 7in. X 4½' each.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..

APPENDIX G—(*concluded*)

Details of pumps, filters, tanks, reservoirs, rising mains, and other details of the water-works of the United Provinces for 1922-23.

Item nos.	Particulars	Agra	Allahabad	Benares	Cawnpore	Lucknow	Meerut	Mussoorie	Naini Tal	Dehra Dun	Jhansi	Mirzapur	Muttra	Fyzabad	Hardwar	Unao	Koil	Fatehpur-Sikri	Aligarh	Gola-gokarnanath
13	Number of clear water reservoirs.	Three ..	Two ..	Two ..	Three ..	Two ..	One ..	Six	One ..	..	..	..	..	..	..	..	..	..	..	
14	Size of clear water reservoirs.	105' × 103' × 10' each.	116·8' × 181·8' × 12' each.	178½' × 148½' × 12' each.	Two old—135' × 106½' × 12' each. One new—135' × 200' × 12'.	107' × 105' × 12' each.	52½' × 48' × 7'	1. 48' × 25' × 8' Murray Spring. 2. 30' × 20' × 8' Mackinnon Spring. 3. 43' × 25' × 8' Bhilaru Spring. 4. 3—14' dia. × 12' each, Landaur.	45' × 40' × 6' ..	..	..	..	..	..	..	..	..	..	..	
15	Capacity of clear water reservoirs, Gallons.	676,000 each ..	1,168,700 each ..	1,854,068 each ..	Two old—953,300 each. One new—2,045,000.	793,500 each ..	110,600 ..	1. 60,000 .. 2. 30,000 " 3. 60,000 .. 4. 10,000 each.	67,500	..	..	..	..	..	..	..	..	..	..	
16	Number of service reservoirs.	Four ..	One ..	One ..	Two ..	One ..	Two ..	Sixteen ..	Eighty-eight ..	..	Eleven ..	One ..	Two ..	One ..	Two ..	One ..	One ..	Two ..	One ..	Two
17	Size of service reservoirs.	H. Z. (1) 66' dia. × 11½' deep. L. Z. (2) 23' × 16' × 8' each. (1) 60' × 16' × 8'.	59·25' dia. × 31' deep.	60' dia. × 15' deep.	50·3' × 35' at parade. 50·5' × 40' at water works.	60' × 60' × 12' ..	25' × 34' each ..	Gun Hill. 1. 78' × 37½' × 12'. 2. 20' × 30' × 8' Vincent Hill. 3. 54½' × 52' × 14' 4. 40' × 25' × 8' 5. 40' × 25' × 8' Savoy Hill. 6. 30' × 24' × 6' Landour Hill. 7. 6—14' dia. × 12' each. Dunidin. 8. 4—14' dia. × 12' each.	Small .. 82 Large .. 6 *Small.* 32—3' × 3' each. 29—2·6' × 3' each. 1—4' × 3'. 3—4' × 5' each. 17—6' × 8' × 4' each. *Large.* 1—35' × 15' × 9·5' 1—29·5' × 15' × 9·5'. 1—20' × 10'. 1—18' × 10'. 2—22·5' × 13·3' each.	..	1—40' × 15' × 8' 3—4' × 4' × 4' each. 7—5' × 5' × 5' each.	200' × 75' × 14' deep.	32' × 20' each ..	29'—7¼' dia. × 15'—6' deep.	62'—8' × 60' × 12' each.	20' × 20' × 12' ..	12' dia. × 14'·6' ..	20' × 20' × 4' .. each.	46'·6' × 56'·0' × 11'·6'.	1—16' × 10' × 6' 2—12' × 12' × 12
18	Capacity of service reservoirs. Gallons.	H. Z. 275,000 L. Z. 2—24,000 each. 1—48,000	500,000	265,000	At parade 821,806 At water-works 396,785	200,000	100,000 each	(1) 219,375 (2) 30,000 (3) 250,000 (4) 60,000 (5) 50,000 (6) 72,000 (7) 6—10,000 each (8) 4—10,000 "	228,070	..	1—30,000 3—400 each 7—779 each	1,310,000	100,000 each	120,000	250,000 each	30,000	10,000	10,000 each.	200,000	1—5,000 2—10,000
19	Number of public standposts.																			
	One tap ..	240	102	136	104	351	9	33	173	39	4	34	211	45	7 } Fitted with	21	10	..	49	..
	Two taps ..	79	44	63	51	180	..	12	..	49	8	27	44	42	48 W. N. cocks.	15	17	13 } Fitted with	53	..
	Four taps ..	65	43	1	81	..	..	..	..	Three taps 6	Three taps 14									
	W. N. cocks ..	129	205	81	} 119		165	10	..	4	9	9	..	..	4	1	..	18 } W. N. cocks.	..	..
	Bibcocks ..	2	137	1		..	..	27	..	..	..	94	..	24	..	..	..	..	3	6
	Push cocks ..	102	115	..		..	..	10	..	..	..	83	..	..	8	22	..	..	..	
	Wall fountains ..	Nil	..	55	..	..	..	..	..	..	..	12	..	..	2 (Garden fountain).	..	..	..	..	
	Other types ..	10	15	1	..	..	..	..	..	..	Tanks 10	..	..	..	27	1	..	Six taps 4	..	Service tanks 3.
	Total ..	623	661	345	355	*531	174	93	73	98	45	251	255	111	96	60	27	35	103	9
20	Number of fire hydrants.	148	194	87	155	417	97	..	28	..	..	122	8	48	10	17	16	[illegible]	10	[illegible]
21	Number of road watering posts or standpipes.	48	127	167	16	93	Swan neck 9 Cocks 84	6	..	4	1	6	9	17	3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
22	Number of cattle troughs.	64	55	95	25	48	18	9	6	8	6	20	41 Flushing tanks 5 Flushing pipes 17 Urinal connections 73 Washing ghats 9 Pail depots 3 Connections to [illegible] tanks [illegible]	7	4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

* All the standposts fitted with W. N. cocks.
† Hydrants and fire standposts.

APPENDIX H

Detailed estimate of expenditure incurred on health works under the supervision of the Superintending Engineer, Public Health Department, during the year 1932–33

Serial number	Name of places	Water works original and special repairs	Water works maintenance	Drainage works	Other works	Total
1	Agra	3,900 9,223	150,270	7,121	3,179(1)	173,503
2	Aligarh	411	29,070	1,253	3,933(2)	34,667
3	Allahabad	..	220,188	3,762	4,068	228,018
4	Allahabad Magh Mela	..	12,534	..	10,216(3)	22,750
5	Almora	1,114	189	429	92	1,824
6	Amroha	..	..	1,196	..	1,196
7	Atrauli	116	..	89	348	553
8	Azamgarh	..	..	159	6,844(4)	7,003
9	Ballia	479	..	279	712(5)	1,470
10	Balrampur	..	..	1,274	686	1,960
11	Banda	1,456	..	532	11,356(6)	13,344
12	Bareilly	1,570	..	15123 (7) 13,582	17,187 (8)	47,462
13	Baraut	..	..	61	44	105
14	Banbhulpura (Haldwani)	..	..	34,430	..	34,430
15	Bola (Partabgarh)	141	..	508	668	1,317
16	Benares	14,098 11,411	230,645	13,432	3,272	272,908
17	Bhargada (Shahjahanpur)	..	..	3,850	..	3,850
18	Bijnor	161	..	352	3,077(9)	3,590
19	Bisalpur	..	..	760	1,334	2,094
20	Brindaban	56	..	340	24,582(10)	24,978
21	Budaun	319	..	1,239	187	1,795
22	Bulandshahr	306	..	1,257	2,151,(11)	3,714
23	Cawnpore	7,983	276,588	103,830	108,752(12)	497,153
24	Chandausi	..	..	45	2,724(13)	2,769
25	Chirgaon (Jhansi)	..	..	773	..	773
26	Dehra Dun	5,000 918	9,939	6,189	1,985(14)	24,031
27	Dewa (Bara Banki)	12,844	..	..	..	12,844
28	Dhampur	939	..	206	5,546 (15)	6,691
29	Etah	85	..	631	2,050(16)	2,766
30	Etawah	87	..	16,943	1,648	18,678
	Carried over ..	72,517	9,99,429	2,29,795	2,16,641	14,58,376

(1) For new pavements.
(2) Includes Rs.2,020 for road pavings.
(3) Electric supply.
(4) Includes Rs.6,495 for purchase of latrine materials and freight.
(5) Includes Rs.478 for rat proof godown repairs.
(6) Includes Rs.8,087 for road metalling and Rs 2,571 for latrine.
(7) Anti-malarial works.
(8) Includes Rs. 2,020 for road paving.
(9) For road repairing.
(10) Infectious diseases hospital.
(11) Includes Rs.1,438 for collection and consolidation of kankar.
(12) Includes Rs.57,574 for laying 2' Mexhalt concrete road.
(13) Includes Rs.2,423 for meat market.
(14) Infectious diseases hospital.
(15) Road metalling.
(16) Includes Rs.1,925 for road repairs.

APPENDIX II—(*continued*)

Detailed estimate of expenditure incurred on health works under the supervision of the Superintending Engineer, Public Health Department, during the year 1932–33

Serial number.	Name of places	Water works original and special repairs	Water works maintenance	Drainage works	Others works	Total
	Brought forward ..	72,517	9,39,423	2,29,795	2,16,641	14,78,376
31	Farrukhabad-cum-Fatehgarh ..	..	..	1,363	..	1,363
32	Fatehpur	158	..	138	..	296
33	Fatehpur-Sikri	8,758	3,865	..	..	12,623
34	Firozabad	..	..	..	1,420	1,420
35	Fyzabad	5,638	27,847	683	309	34,482
36	Ghaziabad	33	..	2,048	..	2,081
37	Ghazipur	80	..	185	17	282
38	Gorakhpur	582	..	1,340 26,159 (17)	9,654 (18)	38,235
39	Gola Gokarannath	..	3,120	..	..	3,120
40	Gonda..	..	..	699	..	699
41	Haldwani	..	..	593	1,378	1,971
42	Hardoi	69	..	237	19	325
43	Hardwar	8,319	22,590	3,180	22,473(19)	56,502
44	Hathras	276	..	1,230	..	1,506
45	Janwari (Kheri)	..	..	426	..	426
46	Jalesar	..	..	74	..	74
47	Jaunpur	9,623	..	1,993	1,767(20)	13,383
48	Jhansi	..	17,373	..	750	18,123
49	Kaimganj	..	..	1,032	..	1,032
50	Kairana	..	..	148	151	299
51	Kalyanpur (Cawnpore)	364	..	..	..	364
52	Khurja	56	..	47	4,267(21)	4,370
53	Kosi Kalan	..	5,155	..	672	5,827
54	Lakhimpur Kheri	826	..	2,269	865	3,960
55	Lalitpur	..	..	96	465	561
56	Lucknow	..	307,356	5,024 (22) 56,115	1,393 (23) 5,356	366,140
57	Mau (Jhansi)	612	..	247	361	1,220
58	Meerut	..	27,392	522	1,396	29,310
59	Mirzapur	210	5,288	1,131	1,485	8,114
60	Mogalsarai	..	..	30,571	8,115	38,686
61	Moradabad	..	..	2,293	..	2,293
62	Muttra	24,753	64,444	1,743	2,865(24)	93,205
63	Mussoorie	50,350	82,185	8,248	4,781	145,764
64	Muzaffarnagar	..	..	3,699	16,405(25)	20,104
	Carried over ..	1,82,824	14,96,478	3,35,588	3,03,007	23,57,847

(17) Main drainage.
(18) Includes Rs.4,127 for road metalling and Rs.4,862 for repairs and purchase of sanitary appliances.
(19) Includes Rs.17,398 for female hospital and Rs. 2,600 for filling a low land.
(20) Includes Rs.1,398 for road brick flooring of—

(21) Road works.
(22) Anti-malarial works.
(23) Gomti weir maintenance
(24) Includes Rs.1,855 for brick pavements.
(25) Includes Rs.15,806 for road construction and maintenance.

APPENDIX H—(*concluded*)

Detailed estimate of expenditure incurred on health works under the supervision of the Superintending Engineer, Public Health Department, during the year 1932–33

Serial number	Name of places	Water works original and special repairs	Water works maintenance	Drainage works	Other works	Total
	Brought forward ..	1,82,324	14,96,478	3,85,598	3,03,007	23,57,847
65	Nagina	927	..	600	362	1,889
66	Naini Tal	1,954	59,303	8,281	6,979	76,517
67	Nawabganj (Bara Banki)	43	..	910	49	1,002
68	Orai	276	..	..	39,60(26)	4,236
69	Pahuj (Jhansi)	..	..	2,105(27)	..	2,105
70	Pilibhit	..	..	1,246	417	1,663
71	Pirau Kaliar (Roorkee)	486	..	..	..	486
72	Qutabpur (Sitapur)	..	..	365(27)	..	365
73	Rae Bareli	232	126(28)	615	185	1,158
74	Rampur (Sitapur)	..	..	397(27)	..	397
75	Roorkee	..	..	1,516	7,813(29)	9,329
76	Saharanpur	..	..	6,748	5,619	12,362
77	Sahaswan	..	..	95	2,189	2,284
78	Sambhal	..	..	481	811(30)	1,292
79	Sandila	91	..	85	8,494 (31) 84	8,754
80	Shahpur Pandohie Nadi (Saharanpur)	..	..	434(27)	..	434
81	Shahjahanpur	..	..	319	2,497 (32)	2,816
82	Sitapur	..	..	1,894	2,206	4,100
83	Tanda..	..	..	..	475	475
84	Tilhar	250	..	919	270	1,439
85	Ujhani	..	..	279	463	742
86	Unao	5,314	10,161	65,076	..	80,551
	Total ..	1,92,397	15,66,068	4,77,898	3,85,880	26,22,243

(26) Includes Rs.2,500 for tank improvements.
(27) Canal works.
(28) District jail hand pump.
(29) Includes Rs.6,882 for making kharanja and road metalling.
(30) Kharanja paving.
(31) Meat market.
(32) For road metalling.

APPEN

Comparative statement of fuel consumption, working expenses and receipts

Serial number	Name of water works	Class of work, gravitation or pumping	Fuel consumed		Fuel consumption per 1,000 foot gallons	Price of fuel per ton	Total (average) lift
1	2	3	4		5	6	7
			Tons		Lbs.	Rs.	Feet
1	Agra	Pumping ..	(1)	5,277·91	0·03502	15·42	190·15
2	Allahabad ..	Do. ..	(2)		..	..	347·50
3	Benares ..	Do. ..	(3)		..	..	181·80
4	Cawnpore ..	Do. ..	(4)		..	..	129·42
5	Lucknow ..	Do. ..	(5)		..	..	154·98
6	Meerut ..	Turbines worked by water power.	(6)		..	..	146·91
7	Mussoorie ..	Pumping and gravitation.			..	..	Av. 1,317·64
8	Naini Tal ..	Ditto ..	(7)		..	..	Av. 497·15
9	Dehra Dun ..	Gravitation ..			..	..	Gravity supply
10	Jhansi ..	Pumping ..	(8)	566·55	0·09111	12·40	216·61
11	Mirzapur ..	Gravitation ..			..	..	Gravity supply
12	Muttra ..	Pumping ..	(9)		..	..	Av. 142·12
13	Fyzabad ..	Do. ..	(10)	79·91	0·00608	93·15	Av. 137·58
14	Hardwar ..	Do. ..	..		..	..	177·75
15	Unao	Do. ..	(11)	28·71	0·00860	124·71	130·00
16	Kosi	Do. ..	(12)	8·95	0·00758	144·58	111·15
17	Fatehpur-Sikri ..	Do. ..	(13)	5·12	0·00367	140·70	210·06
18	Aligarh ..	Do. ..	..		..	..	149·95
19	Gola Gokarannath	Do. ..	(14)	4·17	0·02771	155·15	67·80

(1) Coal 4009·80 tons, fuel oil 80·40 tons and electrical charges Rs.18,169 (Rs.1,442 for Maithan and Chili int and Rs.16,726 for raw water pumping plant) converted into coal and fuel oil 1173·21 tons. Coal consumption includes 9·85 tons for municipal purposes.

(2) Pumping done by electric motors. 24·08 tons of coal used for municipal purposes, 12·99 tons of fuel oil used for Daraganj tube-well.

(3) Pumping done by electric motors. Coal consumed 354·31 tons (228·90 tons for tube-wells and workshop, etc. and 125·41 tons for municipal purposes).

(4) Pumping done by electric motors. 184·70 tons of coal used (16·00 tons for workshop and 118·70 tons for municipal purposes).

(5) Pumping done by electric motors. 89·29 tons of coal used (26·25 tons for workshop and 7·00 tons for municipal purposes).

(6) Pumping done by turbine pumps. 15·80 tons of wood used (5·80 tons for trial of steam engine and 10·00 tons for municipal purposes).

DIX I

of various water-works in the United Provinces during the year 1932-33

Percentage of charges for					Per 1,000 gallons		Per head per annum			Remarks
Establishment	Fuel	Oil and waste	Repairs to machinery	Other charges	Total working cost	Total receipt	Total working cost	Total receipt	Profit or loss	
8	9	10	11	12	13	14	15	16	17	18
					As.	As.	As.	As.	As.	
26·31	47·02	5·71	3·32	17·64	1·92	2·66	14·83	20·58	5·70	Profit.
22·11	67·45	0·86	0·34	9·24	2·91	3·93	32·74	44·11	11·37	"
21·75	66·35	0·74	1·26	9·90	1·83	2·02	24·84	27·47	2·63	"
20·76	41·77	0·20	1·49	35·78	1·57	2·95	20·42	38·39	17·97	"
15·71	62·49	0·33	1·38	20·09	2·39	3·42	33·34	47·63	14·29	"
53·87	..	1·42	4·17	40·54	0·92	1·22	4·89	6·51	1·62	"
20·41	54·76	2·84	1·91	20·08	15·94	12·09	151·73	115·04	36·69	Loss.
11·83	61·11	1·16	10·95	14·95	19·28	22·43	91·83	106·86	15·03	Profit.
80·32	..	..	..	19·68	3·32	2·83	9·03	7·69	1·34	Loss.
17·65	44·25	0·57	1·99	35·54	4·32	5·30	7·73	9·48	1·75	Profit.
75·59	..	..	..	24·41	1·23	1·48	10·15	12·22	2·07	"
21·20	74·79	0·75	1·51	1·75	4·77	4·57	22·29	21·34	0·95	Loss.
55·22	28·56	8·21	5·24	2·77	2·94	3·45	17·95	21·09	3·14	Profit.
35·61	56·87	0·84	2·66	4·02	6·38	10·02	47·10	74·61	27·51	"
24·23	41·10	24·29	5·08	5·30	2·82	3·07	12·50	13·61	1·11	"
53·79	25·28	10·94	4·03	5·97	3·44	5·24	11·31	17·22	5·91	"
49·24	20·03	10·97	11·49	8·28	4·16	1·10	10·05	2·65	7·40	Loss.
14·19	80·47	..	0·17	5·17	9·69	2·05	30·79	6·52	24·27	"
63·64	19·52	4·80	9·94	2·60	10·04	0·53	9·66	0·56	9·10	"

(7) Pumping done by electric motors ; No coal consumed during the year.
(8) Includes 24·75 tons of coal for municipal purposes.
(9) Pumping done by electric motors 14·74 tons of fuel oil consumed during the year (14·71 tons for pumping 45·718 million gallons of water by Diesel set and 0·03 tons for municipal purposes).
(10) Includes 0·99 tons for municipal purposes and 3·10 tons for shortage.
(11) Includes 1·25 tons kerosine oil.
(12) Includes 0·05 tons shortage and 0·33 tons kerosine oil.
(13) Includes 0·03 tons shortage.
(14) Includes 0·55 tons kerosine oil.

APPEN

Statement showing initial capital cost, details of income and expenditure

Serial no.	Particulars	Agra	Allahabad	Benares	Cawnpore	Lucknow	Meerut	Mussoorie	Naini Tal
1	Description of plant	Oil Engine, Steam Power and Electric Motors	Steam Power, Oil Engine and Electric Motors	Steam Power and Electric Motor	Steam Power and Electric Motors	Electric Motors	Water Turbines and Steam Power	Gravitation and Electric Motors	Gravitation and Electric Motors
2	Initial capital cost in lakhs. Rupees.	11·71	16·24	25·62	14·45	15·16	7·52	4·80	2·47
3	Total cost of works in lakhs. "	35·94	45·38	44·39	36·77	65·06	8·34	12·94	10·57
4	Number of inhabitants drawing their supply from mains ..	229,764	183,914	205,315	243,755	218,000	91,181	13,057	14,791
5	Hours of supply daily ..	8·53	15·03	9·44	16·30	16·50	18·03	24·00	12·33
6	Quantity supplied during year in millions. Gallons.	1,775·600	2,068·920	2,787·872	3,169·800	3,040·025	487·024	124·277	70·457
7	Total water horse power hours per annum in millions	1·27	1·15	1·30	1·51	0·83	0·32	0·83	0·16
8	Maximum daily average during any one month in millions. Gallons	6·087	6·782	8·027	10·719	9·274	1·487	0·434	0·368
9	Average daily supply for the year in millions. "	4·865	5·668	7·638	8·684	8·329	1·334	0·340	0·193
10	Maximum supply per head per day. "	26·49	36·88	39·10	43·97	42·54	16·31	33·24	16·12
11	Average supply per head per day. "	21·17	30·82	37·20	35·63	38·21	14·63	26·03	13·05
12	Total lift (average) .. Feet.	190·15	245·70	181·80	129·42	154·98	146·91	Av. 1,317·64	Av. 437·15
13	Quantity supplied during the year in million foot. Gallons.	337,630	507,920	506,835	410,236	471,143	71,549	163,752	30,800
14	Fuel consumed .. Tons.	(a) 5,277·91	..	..	..	..	..	..	..
15	Fuel consumption per million foot gallons.. Lbs.	35·02	..	..	..	..	..	..	..
16	Cost of fuel per ton .. Rupees	15·42	..	..	..	..	..	..	..
17	Cost of establishment per million foot gallons. Annas.	1·87	1·60	1·39	2·24	1·59	3·36	1·64	3·64
18	Cost of fuel or electric energy per million foot gallons. "	3·35	4·89	4·33	4·51	6·31	Nil ..	4·40	18·83
19	Cost of oil and waste per million foot gallons. "	0·41	0·06	0·05	0·02	0·03	0·09	0·23	0·36
20	Cost of repairs to machinery per million foot gallons. "	0·23	0·03	0·09	0·16	0·14	0·26	0·15	3·37
21	Cost of other charges per million foot gallons. "	1·26	0·67	0·72	3·36	2·03	2·53	1·61	4·61
22	Total charges per million foot gallons. "	7·13	7·25	7·38	10·79	10·10	6·24	8·03	30·81
23	Maintenance charges per thousand gallons supplied. "	1·35	1·73	1·32	1·40	1·58	0·02	10·68	13·47
24	Interest and sinking fund charges per thousand gallons supplied. "	0·57	1·19	0·51	0·17	0·33	Nil ..	5·36	5·31
25	Total (maintenance and interest and sinking fund per thousand gallons supplied). "	1·92	2·91	1·83	1·57	2·39	0·02	15·04	19·28
26	Maintenance charges in thousand. Rupees.	150·27	230·19	200·65	276·59	297·36	27·89	82·10	59·30
27	Interest and sinking fund charges in thousand. "	63·27	146·18	88·09	34·52	156·86	Nil ..	41·64	125·52
28	Total income in thousand. "	295·51	507·00	352·52	584·68	648·91	97·13	93·86	98·78
29	Profit or loss on maintenance in thousand. "	+145·24	+276·81	+121·87	+308·29	+351·55	+9·24	+11·69	+39·48
30	Profit or loss on maintenance and interest and sinking fund in thousand. "	+81·87	+130·63	+33·78	+273·77	+194·69	+9·24	−29·95	+13·89
31	Profit or deficit percentage on total cost of works.	+2·28	+2·88	+0·76	+7·45	+2·99	+1·13	−2·31	+1·31

(a) Coal, fuel oil and electrical energy converted into coal and fuel oil.

DIX J

water-works in the United Provinces for the year 1932–33.

Dehra Dun	Jhansi	Mirzapur	Muttra	Fyzabad	Hardwar	Unao	Kosi	Fatehpur—Sikri	Aligarh	Golagokarannath
Gravitation	Steam Power	Gravitation	Oil Engine and Electric Motors	Oil Engine and Electric Motors	Electric Motors	Oil Engines	Oil Engine	Oil Engine	Electric Motors	Oil Engines
0·97	0·07	5·08	5·17	9·49	1·97	1.19	0·70	0·52	5·71	0·99
4·84	2·11	7·43	6·56	10·40	4·97	1·92	0·72	0·67	5·04	1·09
40,409	35,961	42,700	59,441	35,000	11,535	13,000	7,294	6,152	35,000	5,164
24·09	9·33	19·00	7·50	9·50	12·00	10·00	10·00	7·00	5·50	10·00
110·000	64·306	352·617	277·316	213·975	85·882	57·549	23·946	14·357	111·253	4·071
..	0·07	..	0·20	0·15	0·08	0·04	0·01	0·02	0·08	0·002
0·495	0·208	1·077	0·933	0·679	0·335	0·174	0·074	0·053	0·412	0·024
0·301	0·176	0·966	0·761	0·586	0·235	0·168	0·066	0·041	0·305	0·013
10·76	5·78	25·22	16·54	19·40	29·04	13·38	10·15	8·62	11·77	4·65
7·46	4·90	22·62	12·80	16·75	20·40	12·13	8·99	6·62	8·71	2·64
Gravity supply	216·61	Gravity supply	Av. 142·12	Av. 137·58	177·75	130·00	111·15	210·03	149·95	67·80
..	13,929	..	39,483	29,439	15,266	7,481	2,662	3,121	16,632	337
..	(b) 566·55	..	..	(c) 79·01	..	(d) 28·71	(e) 8·95	(f) 5·12	..	(g) 4·17
..	91·11	..	..	6·03	..	8·60	7·53	3·67	..	27·71
..	12·40	..	..	95·15	..	124·71	144·58	140·70	..	155·15
..	3·52	..	5·54	8·36	8·40	5·27	16·67	9·75	3·96	93·39
..	8·63	..	19·53	4·32	13·49	8·93	7·88	9·97	23·44	28·91
..	0·11	..	0·10	1·24	0·20	5·28	3·89	2·17	Nil	7·26
..	0·40	..	0·40	0·79	0·63	1·10	1·24	2·28	0·04	14·72
..	7·09	..	0·46	0·42	0·95	1·15	1·85	1·64	1·44	3·85
..	19·95	..	26·12	15·13	23·61	21·78	30·98	19·81	27·88	148·13
1·45	4·32	0·24	3·71	2·08	4·20	2·82	3·44	4·16	4·13	10·04
1·87	Nil	0·99	1·06	0·86	2·13	Nil	Nil	Nil	5·51	Nil
3·32	4·32	1·23	4·77	2·94	6·33	2·82	3·44	4·16	9·69	10·04
9·94	17·37	5·29	54·44	27·85	22·58	10·16	5·16	3·36	29·07	3·12
12·87	Nil	21·79	18·55	11·43	11·42	Nil	Nil	Nil	38·28	Nil
19·42	21·80	32·61	79·27	46·14	53·79	11·06	7·85	1·02	14·25	0·13
+9·48	+3·93	+27·32	+14·83	+18·29	+31·26	+0·00	+2·80	—2·84	—14·82	—2·94
—3·39	+3·93	+3·63	—3·52	+6·86	+19·84	+0·90	+2·69	—2·34	—53·10	—2·94
—0·70	+1·36	+0·74	—0·54	+0·65	+3·99	+0·47	+3·72	—4·22	—8·94	—2·69

(b) Coal.
(c) Fuel oil.
(d) Do.
(e) Fuel oil.
(f) Do.
(g) Do.

APPENDIX K

Hydro-electric Supply

1932–33

Particulars	Mussoorie	Naini Tal
1. Total units generated	3,458,085§ 214,387*	1,096,389
2. Maximum units for any one day	11,525§ 4,843*	4,197
3. Average load K. W.	598§ 172*	158·37
4. Power Factor —		
Maximum	0·95	0·96
Minimum	0·75	0·14
5. Load Factor—		
Maximum (monthly)		
Average..	0·45	0·44
Minimum (monthly)		
6. Generating Volts—		
Maximum	7,000	3,500
Minimum	6,600	3,500
7. Total hours of running	8,978·00§ 1,420·56*	8,747
8. Total cubic feet of water used	207,485,100	39,264,970
9. Maximum quantity used in any month, cubic feet	19,887,020	3,735,080
10. Minimum quantity used in any month, cubic feet	14,943,960	2,777,440
11. Average rate of discharge, cubic feet per diem	568,452	107,575
12. Maximum rate of discharge of pipe line :		
No. 1, cubic feet per second	8·30	Both lines worked together
No. 2, cubic feet per second	8·30	
13. Minimum rate of discharge of pipe line :—		
No. 1, cubic feet per second	7·30	
No. 2, cubic feet per second	7·30	
14. Average intake level		9·37
15. Maximum intake level	4,491	12·00
16. Minimum intake level		5·20
17. Total rainfall for the year, inches	104·29	136·53
18. Total cubic feet allowed to pass through the lake sluice overflow intake weir (million cubic feet) (Naini Tal only).	..	254·41
19. Maximum recorded rainfall for 24 hours, inches	7·90	10·64

§ Hydro-electric.
* Diesel Sets.

APPENDIX L

1932-33.

PARTICULARS CONCERNING HARDWAR ELECTRIC SUPPLY

1. Total units received	362,226
2. Maximum units for any one day	1,265
3. Average load K.W.	75
4. Power factor—	
Maximum	0·85
Minimum	0·39
5. Load factor—	
Maximum (monthly)	..
Average	..
Minimum (monthly)	..
6. Receiving Volts—	
Maximum	410
Minimum	380

APPENDIX M

Statement showing electric energy consumed, rate charged and revenue derived

1932–33

Particulars	Mussoorie			Naini Tal			Hardwar		
	Units	Rate	Rs.	Units	Rate	Rs.	Units	Rate	Rs.
1. *For municipal purposes—*									
Public lighting ..	185,000	Two annas ..	25,327	130,856	Lump sum ..	21,000	62,330	Three annas and seven pies.	14,845
	*192,720	Contract rate.* ..	*24,198						
W. S. Pumping	708,511	One anna	44,282	185,570	Different rates † ..	36,241	102,831	Two annas ..	12,812
Other purposes	297,456	..	18,591	15,201	..	5,017	2,591	Three annas and seven pies.	464
2. *Sold by meter—*									
Lighting	360,570	Six annas	1,12,330	209,987	Eight annas ..	81,296	†50,024	Six annas	19,290
	*383,105	Six annas * ..	*1,31,226				**31,488	Four annas ..	7,842
Heating	244,960	One anna	7,034	107,178	One anna and four pies	6,714	..	..	..
	*576,576	One anna* ..	*32,711						
Power	..	..	..	10,880	Two annas and eight pies	1,374	85,012	One anna and six pies	8,373
3. Recoveries on rated premises	..	Included in lighting item 2 ..		36,500	Rupees two per lamp per mensem.	7,612	13,050	..	3,791
4. Other receipts	..	..	10,548	706	..	2,024	..	..	1,283
5. Meter rent and miscellaneous.	..	..	7,049	..	..	6,814	..	..	1,807
			*11,162						
6. Total units sold and receipts	§2,948,988	..	4,25,408	(a)696,938	..	1,68,902	347,826	..	70,512

*For Debra Dun.
§Does not include 723,484 units losses in transmission, etc.
(a) Does not include 139,356 units free supply.

†Private.
**Railway.
‡176,065 at Re. 0-3-0
8,105 at Re. 0-6-0
710 at Re. 0-1-0

APPENDIX N

Statement showing number of electric connexions

1932–33.

Particulars	Mussoorie		Naini Tal		Hardwar	
	Number	K. W.	Number	K. W.	Number	K. W.
1. Private connexions at close of preceding year.	2,446 *3,172	..	1,606	..	549	..
2. Connexions made during the year	126 *248	..	133	..	93	..
3. Motored connexions existing on 31st March, 1933.	1,176 *1,623	..	933	..	334	..
4. Municipal lamps existing on 31st March, 1933.	874† *1,008‡	..	512	..	556	..
5. Heating points connected on 31st March, 1933.	404 *247	..	256	..	..	..
6. Total K. W. connected on 31st March, 1933.	..	4,230	..	1,730·52	..	390
7. Peak load for the year ...	..	H. E. 785 Diesel 516	..	365	..	152
8. Diversity factor per cent. ..	..	45	..	21·09	..	..

*For Dehra Dun.
†Civil area 815. Cantonment 59.
‡Civil area 735. Cantonment 273.

APPENDIX O

Hydro-electric supply

Annual maintenance account

1932–33.

Particulars of charges	Mussoorie	Naini Tal
	Rs.	Rs.
I.—Staff Charges—		
(*a*) Direction	24,793	7,109
(*b*) Office establishment	23,360	12,406
(*c*) Power station staff	21,093	3,773
(*d*) Sub-station staff	4,878	1,974
(*e*) Pipe line staff	..	1,017
(*f*) Overhead line staff	16,982	5,426
(*g*) Auxiliary pump	..	261
(*h*) Contingencies	12,484	2,378
II.—Materials—		
(*a*) Oils		
(*b*) Lubricants		
(*c*) Waste	22,992	1,500
(*d*) Buildings		
III.—Repairs—		
(*a*) Machinery	14,962	1,457
(*b*) Pipe line	8,896	837
(*c*) Overhead line	22,961	3,607
(*d*) Buildings	3,614	112
IV.—Rents		..
V.—Printing	Included in item 1(*b*).	100
VI.—Stationery		666
VII.—Insurance		524*
VIII.—Total maintenance charges	1,76,818	42,597
IX.—Interest and sinking fund charges	1,98,470	1,10,417
X.—Total annual charges	3,75,288	1,53,944
XI.—Total units generated	3,672,472	1,096,282
XII.—Total units sold	2,948,988	696,938
XIII.—Cost per unit generated .. .. .. Annas	1·64	2·23
XIV.—Cost per unit sold .. .. Annas	2·04	3·51

* Refunds.

APPENDIX P

Annual Maintenance Account

1932–33.

HARDWAR ELECTRIC SUPPLY-PARTICULARS OF CHARGES.

		Rs.
I—Staff charges—		
(a) Direction		3,300
(b) Office establishment		1,380
(c) Sub-station staff		1,824
(d) Overhead line staff		2,690
(e) Contingencies		..
II—Cost of electric energy purchased during the year from Irrigation Department		39,209
III—Materials—		
(a) Oils		..
(b) Lubricants		..
(c) Waste		..
(d) Buildings		..
IV—Repairs—		
(a) Machinery		..
(b) Overhead line including cost of bulbs		1,983
(c) Buildings		350
V—Rents		60
VI—Printing		250
VII—Stationery		150
VIII—Insurance		..
IX—Miscellaneous	(a) Service; (b) Capital outlay	59
X—Total maintenance charges		51,555
XI—Interest and Sinking Fund charges		14,752
XII—Total annual charges		66,307
XIII—Total receipts during the year		70,512
XIV—Total units purchased		362,226
XV—Total units sold		347,326
XVI—Profit during the year		4,205
XVII—Total loss in transformer and transmission, etc.	Units	14,900
XVIII—Cost per unit purchased	Annas	2·93
XIX—Cost per unit sold	Annas	3·05

APPENDIX Q

A—List of projects finally sanctioned during the year 1932–33

I—Provincial

(*a*) *Fair projects*—

		Rs.
1.	Allahabad Magh Mela water supply and maintenance, 1932-33 ..	1,178*
2.	Allahabad Magh Mela water supply and maintenance, 1932-33 ..	13,905
3.	Allahabad Magh Mela Pumping Station, land acquisition for— ..	91
4.	Allahabad Magh Mela electrification, 1932-33	10,834
5.	Cawnpore-Kalyanpur Criminal Tribes Settlement wells—cleaning and repairing	402
6.	Dewa (Bara Banki) Fair water supply, 1932	1,838
7.	Lucknow Gomti Weir maintenance	1,371
8.	Lucknow Gomti Weir annual repairs	497
9.	Meerut Roads and drainage improvements in front of the Executive Engineer's Office, 1st Division, Public Health Department	1,413
10.	Piran Kaliar (Roorkee) Water Supply—cleaning and testing pumping plant and running during the Mela, 1932 ..	435
11.	Rae Bareli District Jail Well Hand Pump repairs ..	126
		30,912

(*b*) *Preliminary proposals*—

Nil

(*c*) *Forecasts of cost*—

1.	Cawnpore-Kalyanpur Criminal Tribes Settlement wells—cleaning and repairing	402
2.	Dewa (Bara Banki) Fair Water supply, 1932	1,838
		2,240

II—Deposit works

(*a*) *Fair projects*—

1.	Almora water supply maintenance and running	420
2.	Banbhulpura drainage (revised)	42,130
3.	Bareilly anti-malaria and drainage outfall completion ..	18,000
4.	Fatehpur-Sikri (Agra) water supply—providing extra standposts	4,000
5.	Fyzabad water supply tube-well near tube-well no. 3 ..	12,039
6.	Ghazipur water supply trial tube-well	19,770
7.	Gorakhpur drainage	3,44,501
8.	Hardwar water supply extension 4th tube-well at Mayapur ..	14,721
9.	Hardwar water supply extension construction of a 4th tube-well and laying 10" supply main	11,753
10.	Hardwar Infectious Diseases Hospital additions to	24,990
11.	Hardwar Adh Kumbh water supply 1932	7,272
12.	Jaunpur water supply	4,11,037
13.	Sandila Nawab Mohammad Yusuf meat market	9,687
14.	Unao water supply extension (supplementary)	6,227
		9,26,581

(*b*) *Preliminary proposals*—

Nil

(*c*) *Forecasts of cost*—

1.	Agra Cantonment water supply Improvement providing boosting pumps at Rakabganj and Fort	23,000
2.	Dehra Dun Bandal Nadi water supply	4,11,800
3.	Hardwar water supply 4th tube-well	40,000
4.	Jaunpur water supply	1,29,300
5.	Meerut Civil Lines water supply improvements—	
	1st alternative	29,600*
	2nd ditto	71,000
		6,98,700

B—List of projects submitted but not sanctioned during the year 1932–33

I—Provincial

(*a*) *Fair projects*—

		Rs.
1.	Allahabad Magh Mela water supply and maintenance, 1933-34 running of—	1,305*
2.	Allahabad Magh Mela water supply and maintenance, 1933-34 ..	14,000
3.	Cawnpore Industrial School drainage and sanitary fittings ..	22,490
4.	Cawnpore Harcourt Butler Technological Institute Principal's Bungalow drainage and sanitary fittings	7,806
5.	Lucknow Gomti Weir maintenance, 1933-34	1,371
6.	Lucknow Ghaziuddin Hyder Canal maintenance, 1933-34 ..	7,329
		52,996

APPENDIX Q—(*continued*).

(*b*) *Preliminary proposals*—

Nil

(*c*) *Forecasts of cost*—

		Rs.
1.	Allahabad Magh Mela water supply installation of an electricaly driven pumping plant	30,542
2.	Baubasa water supply	7,000
		37,542

II—DEPOSIT WORKS

(*a*) *Fair projects*—

1.	Agra water supply metering connections in low lying areas ..	48,000
2.	Agra Cantonments water supply improvements providing boosting pumps	25,307
3.	Allahabad metering and waste prevention	1,73,043
4.	Bareilly anti-malaria—Jail compound storm water drain ..	11,507
5.	Cawnpore sewage disposal	5,22,264
6.	Jhansi water supply	44,580
7.	Sandila Mohammad Yusuf meat market (revised)	9,687
		8,34,488

(*b*) *Preliminary proposals*—

Nil

(*c*) *Forecasts of cost*—

1.	Almora water supply extension	21,337
2.	Benares University two tube-wells	34,000
3.	Bindhachal (Mirzapur) water supply	68,500
4.	Bindhachal (Mirzapur) trial bore	10,000*
5.	Haldwani water supply new filtration plant	17,125
6.	Jhansi water supply extension	62,244
7.	Lucknow Queen Marry's Hospital tube-well	3,718
8.	Lucknow Queen Marry's Hospital tube-well alternative ..	1,360
9.	Meerut Civil Lines tube-well providing boosting pumps for ..	8,000
10.	Moghalsarai water supply	32,643
11.	Naubanwan (Gorakhpur) water supply	6,080
12.	Pilibhit tube-well, pumping plant and pump house ..	13,200
13.	Ramnagar drainage	44,729
14.	Sandila (Hardoi) water supply tube-well	14,000*
15.	Sandila water supply	32,196
16.	Sheopur Town Area (Benares) drainage	5,636
		3,51,768

C—List of projects under preparation with approximate estimated amount

I—PROVINCIAL WORKS

(*a*) *Fair project*—

		Rs.
1.	Allahabad Magh Mela electrification	10,834

(*b*) *Preliminary proposals*—

Nil

(*c*) *Forecast of cost*—

Nil

II—DEPOSIT WORKS

(*a*) *Fair projects*—

1.	Agra Dayalbagh drainage	1,86,000
2.	Cawnpore drainage, Part VI	2,26,000
3.	Cawnpore Permat Sewage pumping station reorganization ..	2,07,408
4.	Dehra Dun Lakhibagh drainage	30,000
5.	Dehra Dun sewage farm (revised)	20,000
6.	Fyzabad water supply extension and supplementary estimate ..	2,537
7.	Tanyard godown type design	25,000
		6,95,945

(*b*) *Preliminary proposals*—

Nil

(*c*) *Forecasts of cost*—

1.	Deoria drainage	21,164
2.	Jaunpur drainage improvements	1,00,000
		1,21,164

APPENDIX Q—(*concluded*)

D—List of works delayed for want of sta

Projects—

1. Agra drainage, first instalment.
2. Agra pressure survey of the pipe line.
3. Cawnpore sewage disposal.
4. Cawnpore drainage, Part VI.
5. Cawnpore Industrial School drainage and sanitary fittings.
6. Cawnpore Harcourt Butler Technological Institute Princip and sanitary fittings.
7. Meerut drainage 1st instalment.
8. Muttra High Zone water supply improvement (forecast of cos

Completion reports—

1. Agra water supply new mechanical filters.
2. Agra water supply extension to raw water pumping plant.
3. Dehra Dun Infectious Diseases Hospital.
4. Dehra Dun water softening and chlorinating plant.
5. Fatehpur-Sikri Mela water supply.
6. Kaimganj drainage.
7. Kosi water supply.
8. Muttra water supply extension, Tube-Well no. 5.
9. Muzaffarnagar new Mandi drainage.
10. Piran Kaliar (Roorkee) water supply.
11. Rikhikesh Infectious Diseases Hospital.

APPENDIX R

Revenue derived from sewage farms during the year 1932-33

Sl. no.	Particulars	Agra	Allahabad	Dehra Dun	Lucknow	Muttra
1	Area under cultivation in acres ..	164·00	241·00	4·19	(4) 685·63	(7) 64·04
2	Total rent demanded from cultivators .. .. Rs.	13,716	(1) 22,326	350	(5) 12,093	6,987
3	Average rent per acre per annum Rs.	83·64	92·64	83·53	52·49	111·63
4	Quantity of sewage treated in million gallons.	Not supplied.	(2) 695·4	1·23	Not supplied for want of meter.	81·29
5	Average quantity of sewage consumed per acre per diem.		7,905·5	802		3,589
6	Expenditure incurred on the maintenance of the farms.. Rs.	4,777	6,724	Nil	(6) 3,882	1,022
7	Revenue derived .. Rs.	13,716	17,729	350	12,093	6,987
8	Profit .. .. "	8,939	11,005	350	8,211	5,965
9	Loss .. .. "	Nil	Nil	Nil	Nil	Nil

(1) This amount does not include Rs.6,566 representing cost of sewage sold to the Agricultural Institute.

(2) This figure does not include 125·63 million gallons of sewage sold to the Agricultural Institute.

(3) Excludes Rs.2,000 cost of sewage realized from the Agricultural Institute.

(4) Only 173 acres of land were treated with sewage.

(5) Only Rs.9,343 were realized as rent from the area irrigated with sewage.

(6) This amount does not include Rs.14,100 paid in repayment of interest and sinking fund on loans.

(7) Only 55·31 acres were treated with sewage up to July, 1933.

APPENDIX S

Statement of expenditure on construction works carried out by the Engineering Branch of the Public Health Department during 1932–33

Serial number	Name of works	Estimated cost	Total expenditure up to the end of March, 1932	Expenditure incurred during the year
	I—Provincial	Rs.	Rs.	Rs.
1	Allahabad Magh Mela Water Supply for 1932-33 ..	13,200	..	12,534
2	Allahabad Magh Mela Water Supply and Maintenance, 1932-33.	1,178	..	636
3	Allahabad Magh Mela Water Supply Maintenance for 1932-33.	699	..	634
4	Allahabad Magh Mela electrification	10,634	..	10,216
5	Cawnpore—Kalyanpur Criminal Tribes Settlement Wells—cleaning and repairs.	402	..	364
6	Dewa (Bara Banki) water supply	57,859	3,428	11,006
7	Dewa (Bara Banki) fair temporary water supply, 1932	1,838	..	1,838
8	Lucknow anti-malarial and drainage works—Ghazi ud-din Hyder Canal Maintenance, 1932-33.	8,000	..	5,924
9	Lucknow Gomti Weir Maintenance, 1932-33 ..	1,668	..	1,395
10	Meerut roads and drainage improvements in front of Office of Executive Engineer, I Division, Public Health Department.	1,418	..	592
11	Piran Kaliar (Roorkee) water supply	39,827	24,928	70
12	Piran Kaliar (Roorkee) Mela water supply	435	..	416
13	Rae Bareli District Jail hand pumps repairs ..	126	..	126
				45,751
	II—Deposit works			
1	Agra water supply extension to raw water pumping plant.	90,557	82,939	398
2	Agra new mechanical filtration plant	2,84,250	2 ,05,072	3,835
3	Ajodhya (Fyzabad) two tube-wells	37,112	14,120	..
4	Allahabad Civil Lines two tube-wells	41,193	1,020	..
5	Almora water supply	1,75,342	1,73,657	1,114
6	Almora water supply maintenance and running ..	420	..	189
7	Banbhulpura drainage..	72,120	7,315	34,480
8	Bareilly anti-malarial work—outfall	18,000	2,726	15,123
9	Benares water supply extension	5,12,955	5,05,586	14,098
10	Brindaban Infectious Diseases hospital	44,636	1,070	24,582
11	Brindaban water supply 3rd trial bores and 4" tube-well	7,901	7,193	56
12	Dehra Dun water softening and chlorinating plant ..	81,609	45,382	918
13	Dehra Dun Infectious Diseases Hospital	46,621	30,186	1,985
14	Fatehpur-Sikri water supply—providing extra stand-posts.	14,000	..	3,974
15	Fatehpur-Sikri Mela water supply	14,800	6,673	4,784
16	Fyzabad water supply	55,269	30,262	5,320
17	Fyzabad water supply—a tube-well near tube-well no. 3.	12,083	..	318
18	Gorakhpur drainage	3,44,501	..	26,159
19	Hardwar water supply extension—laying a 8" main ..	11,758	..	4,990
20	Hardwar water supply extension, Mayapur 4th tube-well.	14,721	..	798
21	Hardwar Adh Kumbh Mela temporary water supply, 1933.	7,372	..	2,581
22	Hathras water supply	5,32,741	..	123
23	Hathras water supply tube-wells nos. 3, 4 and 5 ..	34,800	33,178	153
24	Jaunpur water supply	4,11,097	..	9,623
25	Jhansi-Ohirgaon drainage improvements	94,988	94,678	778
26	Kaimganj drainage	60,415	57,046	1,032
27	Kanauj drainage, Block "E"	15,097	742	..
28	Moghalsarai drainage	32,405	1,593	30,571
29	Moradabad flushing-installation of electric motor ..	3,601	500	2,293
30	Muttra Banjatra Route water supply—wells at Jamalpur and Talban.	7,372	4,765	3
31	Muttra laying sewage farm and irrigation gulls ..	7,922	7,088	327
32	Muttra water supply—additional tube-well no. 5 ..	55,811	22,154	24,153
33	Muzaffarnagar New Mandi drainage	4,63,447	1,46,660	46
34	Rikhikesh Infectious Diseases Hospital	33,039	31,371	..
35	Sandila—Nawab Mohammad Yusuf meat market ..	9,687	..	8,494
36	Unao water supply extension—additional pumping plant	37,636	26,215	5,314
37	Unao drainage	1,89,316	6,472	65,076
				2,98,622

STATEMENTS SHOWING RATES OF INCREASE OF MUNICIPAL WATER SUPPLY IN THE UNITED PROVINCES FROM THE YEAR 1922-23 TO 1932-33

AGRA WATER-WORKS

Particulars	Years										
	1922-23	1923-24	1924-25	1925-26	1926-27	1927-28	1928-29	1929-30	1930-31	1931-32	1932-33
1. Quantity of water consumed—											
(a) Metered .. .. Million gallons.	229·039	216·769	215·219	248·789	261·580	265·864	293·966	308·330	330·209	306·533	287·573
(b) Unmetered .. .. "	1,404·214	1,457·534	1,427·792	1,417·342	1,427·587	1,531·578	1,614·415	1,761·280	1,715·511	1,729·537	1,488·027
Total "	1,633·253	1,674·303	1,643·011	1,666·131	1,689·167	1,797·442	1,908·381	2,070·110	2,045·720	2,036·070	1,775·600
2. Consumption per head per day in gallons ..	24·06	24·60	24·21	24·54	24·89	26·41	28·12	30·50	30·14	24·21	21·17
3. Number of connexions—											
(a) Metered	150	135	164	187	211	211	232	277	341	377	320
(b) Unmetered	3,491	3,666	3,975	4,290	4,467	4,612	4,819	4,978	5,086	5,250	5,417
Total ..	3,551	3,801	4,139	4,477	4,618	4,823	5,051	5,275	5,427	5,627	5,737
4. Number of standposts	381	399	422	457	477	503	527	579	585	590	623
5. Expenditure in thousands—											
(a) Maintenance .. .. .. Rupees	163·70	161·64	170·78	182·16	178·75	166·57	173·98	138·62	167·84	168·94	150·27
(b) Interest and sinking fund .. "	140·90	65·22	65·12	60·04	54·11	50·46	68·21	68·01	66·57	66·57	63·37
Total "	304·60	226·86	235·90	242·20	232·86	217·03	242·19	206·63	234·41	235·51	213·64
6. Cost per thousand gallons maintenance .. Annas	1·60	1·54	1·66	1·75	1·69	1·48	1·46	1·07	1·31	1·33	1·35
7. Total charges per thousand gallons .. "	2·98	2·16	2·29	2·33	2·20	1·93	2·03	1·60	1·83	1·85	1·92
8. Revenue in thousands—											
(a) Unmetered .. .. .. Rupees	137·18	156·14	159·63	173·02	178·04	178·15	172·07	166·85	193·37	199·73	203·43
(b) Metered .. .. .. "	91·79	79·28	65·92	91·09	90·86	106·53	117·43	123·88	100·35	89·13	92·08
Total "	228·97	235·42	225·61	264·11	268·90	284·68	289·50	290·73	293·72	288·86	295·51
9. Receipt per thousand gallons through—											
(a) Metered supplies .. .. Annas	6·41	5·85	4·90	5·86	5·56	6·41	6·39	6·42	4·86	4·65	5·12
(b) Assessment and ferrule rating .. "	1·56	1·71	1·79	1·95	1·99	1·86	1·70	1·52	1·80	1·85	2·19
10. Profit or deficit in thousands .. .. Rupees	−75·63	+8·56	−10·29	+21·91	+36·04	+67·65	+17·31	+34·10	+59·31	+53·35	+81·37

ALLAHABAD WATER-WORKS

Particulars		Years										
		1922-23	1923-24	1924-25	1925-26	1926-27	1927-28	1928-29	1929-30	1930-31	1931-32	1932-33
1. Quantity of water consumed—												
(a) Metered	Million gallons	231·772	236·343	143·572	193·744	175·113	175·304	157·632	143·336	154·450	154·162	145·371
(b) Unmetered	,,	1,022·497	1,193·075	1,149·713	1,096·283	1,085·090	1,219·172	1,702·411	1,889·692	2,061·916	1,948·540	1,829·549
Total	,,	1,254·269	1,429·417	1,293·285	1,293·030	1,261·203	1,395·000	1,860·073	1,988·028	2,216·396	2,102·702	2,008·920
2. Consumption per head per day in gallons ..		21·85	24·84	22·53	22·53	21·98	24·24	32·41	34·55	33·62	31·24	30·82
3. Number of connexions—												
(a) Metered		454	418	430	461	339	306	345	346	370	378	375
(b) Unmetered		4,619	5,111	5,345	5,509	5,373	5,634	5,913	6,125	6,364	6,707	7,010
Total ..		5,073	5,529	5,781	5,970	5,712	5,940	6,258	6,471	6,734	7 080	7,385
4. Number of standposts		367	385	395	416	522	536	596	594	621	639	661
5. Expenditure in thousands—												
(a) Maintenance	Rupees	198·12	209·32	170·13	166·87	181·87	179·33	178·34	205·60	239·90	225·23	230·19
(b) Interest and sinking fund ..	,,	Nil	35·00	140·38	139·00	124·80	115·37	128·73	156·05	157·40	149·82	146·18
Total	,,	198·12	244·32	310·51	305·87	306·67	294·70	307·07	361·65	397·30	375·15	376·37
6. Cost per thousand gallons maintenance..	Annas	2·53	2·34	2·10	2·06	2·31	2·06	1·53	1·66	1·78	1·71	1·78
7. Total charges per thousand gallons ..	,,	2·53	2·73	3·83	3·78	3·89	3·38	2·64	2·92	2·87	2·85	2·91
8. Revenue in thousands—												
(a) Unmetered	Rupees	195·48	268·31	293·09	270·75	289·30	290·92	304·76	352·17	351·82	407·96	419·59
(b) Metered	,,	91·72	69·48	63·03	59·15	73·40	74·93	75·61	61·44	62·48	63·19	87·41
Total	,,	287·20	337·79	356·12	329·90	362·79	365·85	380·37	413·61	414·30	471·15	507·00
9. Receipt per thousand gallons through—												
(a) Metered supplies	Annas	6·93	4·70	7·02	4·81	6·71	6·82	7·67	6·86	6·47	5·56	9·62
(b) Assessment and ferrule rating ..	,,	3·06	3·60	4·08	3·05	4·26	3·82	2·86	3·06	2·73	3·35	3·40
10. Profit or deficit in thousands	Rupees	+89·08	+93·47	+45·61	+24·03	+56·12	+71·15	+73·30	+51·96	+17·00	+96·00	+130·63

BENARES WATER-WORKS

Particulars	Years										
	1922-23	1923-24	1924-25	1925-26	1926-27	1927-28	1928-29	1929-30	1930-31	1931-32	1932-33
1. Quantity of water consumed—											
(a) Metered .. .. Million gallons.	..	3·333	5·361	11·575	19·144	27·247	30·771	24·323	50·793	48·495	66·960
(b) Unmetered .. .. .. ,,	2,151·331	2,208·441	2,218·339	2,264·090	2,403·714	2,327·264	2,768·813	2,848·628	2,625·867	2,740·095	2,720·912
Total ,,	2,151·331	2,212·279	2,223·700	2,275·665	2,422·858	2,354·511	2,799·584	2,877·951	2,676·660	2,788·590	2,787·872
2. Consumption per head per day in gallons ..	29·71	30·46	30·70	31·41	33·45	32·42	33·65	32·33	36·95	37·11	37·20
3. Number of connexions—											
(a) Metered	3	5	10	42	82	117	140	150	161	177	233
(b) Unmetered	11,178	11,663	12,148	12,488	12,620	12,634	12,807	13,939	14,372	15,789	16,516
Total ..	11,181	11,668	12,158	12,530	12,702	12,751	12,947	14,089	15,033	15,966	16,749
4. Number of standposts	433	433	432	432	437	437	443	465	478	506	512
5. Expenditure in thousands—											
(a) Maintenance .. .. .. Rupees	275·50	233·85	224·95	218·82	202·20	196·50	200·56	214·40	234·52	231·47	230·65
(b) Interest and sinking fund .. ,,	83·23	199·79	118·51	103·36	114·17	109·11	104·74	102·05	90·25	88·09	88·09
Total ,,	358·73	433·64	333·46	322·68	316·47	302·61	305·30	316·45	324·77	319·56	318·74
6. Cost per thousand gallons maintenance .. Annas	2·05	1·69	1·62	1·54	1·34	1·34	1·14	1·44	1·40	1·33	1·32
7. Total charges per thousand gallons .. ,,	2·67	3·13	2·43	2·27	2·09	2·06	1·74	2·13	1·94	1·83	1·83
8. Revenue in thousands—											
(a) Unmetered .. .. .. Rupees	211·90	263·74	268·75	241·69	254·21	227·51	441·79	443·39	305·43	330·92	313·78
(b) Metered .. .. .. ,,	..	9·94	11·21	6·20	9·30	11·02	8·65	6·18	4·69	12·77	38·74
Total ,,	211·90	273·68	279·96	247·89	263·51	238·53	450·44	447·17	310·16	352·69	352·52
9. Receipt per thousand gallons through—											
(a) Metered supplies .. .. Annas	..	*8·12	33·44	8·57	7·77	6·47	4·50	2·33	1·47	4·21	8·78
(b) Assessment and ferrule rating .. ,,	1·57	1·91	1·93	1·71	1·69	1·56	2·55	3·01	1·83	1·99	1·86
10. Profit or deficit in thousands .. .. Rupees	−146·83	−159·96	−53·50	−74·79	−52·96	−64·08	+145·14	+130·72	−14·61	+33·13	+33·78

* Worked on the actual receipt Rs.1,949.

Figures for standposts includes number of road watering posts as they have also got cocks fitted on them for public use.

CAWNPORE WATER-WORKS

Particulars		Years										
		1922-23	1923-24	1924-25	1925-26	1926-27	1927-28	1928-29	1929-30	1930-31	1931-32	1932-33
1. Quantity of water consumed—												
(a) Metered	Million gallons.	616·900	594·797	542·580	557·950	603·782	618·133	701·066	743·895	783·278	818·797	894·238
(b) Unmetered	"	1,682·199	1,716·222	1,847·023	1,888·358	1,872·596	1,846·601	2,189·987	2,157·055	2,233·022	2,379·543	2,275·512
Total	"	2,298·199	2,311·019	2,389·603	2,446·308	2,476·378	2,464·789	2,891·053	2,900·950	3,021·300	3,198·340	3,169·800
2. Consumption per head per day in gallons ..		29·00	29·17	30·26	30·97	31·35	31·12	36·60	36·72	38·24	35·85	35·63
3. Number of connexions—												
(a) Metered		962	932	963	996	1,061	1,061	1,188	1,313	1,477	1,641	1,876
(b) Unmetered		5,272	6,683	7,064	7,470	7,748	7,994	8,556	9,099	9,608	10,114	10,731
Total ..		6,234	7,615	8,027	8,468	8,809	9,055	9,744	10,412	11,085	11,755	12,607
4. Number of standposts		*273	264	272	276	282	284	296	309	327	338	355
5. Expenditure in thousands—												
(a) Maintenance	Rupees	472·62	307·73	373·16	299·33	266·98	253·61	318·71	296·37	294·34	308·93	276·59
(b) Interest and sinking fund ..	"	95·82	78·99	34·52	34·52	34·52	34·52	34·52	34·52	34·52	34·52	34·52
Total	"	568·44	386·72	407·68	333·85	301·50	288·13	353·23	331·39	328·86	343·45	311·11
6. Cost per thousand gallons maintenance ..	Annas	3·29	2·13	2·41	1·96	1·73	1·65	1·76	1·64	1·56	1·55	1·40
7. Total charges per thousand gallons ..	"	3·95	2·67	2·64	2·18	1·95	1·87	1·95	1·83	1·74	1·72	1·57
8. Revenue in thousands—												
(a) Unmetered	Rupees	231·14	353·07	331·16	365·15	375·18	394·50	389·81	403·88	375·30	414·51	411·74
(b) Metered	"	155·03	82·29	111·41	108·39	110·55	122·07	133·48	157·48	140·11	177·60	173·14
Total	"	386·17	435·36	442·57	473·54	485·73	517·57	523·29	561·36	515·41	592·11	584·83
9. Receipt per thousand gallons through—												
(a) Metered supplies	Annas	4·03	2·21	3·28	3·12	2·93	3·16	3·02	3·39	2·84	3·47	3·10
(b) Assessment and formule rating ..	"	2·19	3·20	2·87	3·09	3·21	3·42	2·85	2·99	2·69	2·79	2·90
10. Profit or deficit in thousands ..	Rupees	—182·27	+48·64	+34·89	+139·69	+184·23	+229·44	+169·06	+229·97	+186·55	+248·66	+273·77

*Excluding five bathing platforms.

LUCKNOW WATER-WORKS

Particulars	Years										
	1922-23	1923-24	1924-25	1925-26	1926-27	1927-28	1928-29	1929-30	1930-31	1931-32	1932-33
1. Quantity of water consumed—											
(a) Metered .. .. Million gallons.	190·772	210·183	209·181	254·625	290·689	297·713	360·526	339·025	449·042	438·783	434·600
(b) Unmetered .. .. "	964·188	825·797	1,287·769	1,456·315	1,416·111	1,521·917	1,914·129	1,806·095	2,179·382	2,366·619	2,605·425
Total "	1,154·960	1,035·980	1,496·950	1,710·940	1,706·750	1,819·630	2,274·655	2,145·120	2,628·424	2,805·202	3,040·025
2. Consumption per head per day in gallons ..	15·71	14·06	20·37	23·28	23·23	24·69	30·95	29·19	34·29	35·16	38·21
3. Number of connexions—											
(a) Metered	277	247	318	383	389	422	448	472	510	511	528
(b) Unmetered	5,484	5,586	5,974	7,017	7,700	8,323	9,033	9,591	10,425	11,206	12,066
Total ..	5,761	5,833	6,292	7,400	8,089	8,745	9,476	10,063	10,935	11,717	12,594
4. Number of standposts	445	446*	397*	421	426	434	444	447	447*	530	531
5. Expenditure in thousands—											
(a) Maintenance .. .. .. Rupees	223·18	217·92	243·13	249·35	225·32	204·72	239·75	266·21	287·01	280·74	297·36
(b) Interest and sinking fund .. "	124·52	126·73	140·62	218·97	106·55	246·23	107·30	55·39	146·94	157·37	156·86
Total "	337·70	344·65	383·75	468·32	331·87	450·95	347·05	321·60	433·95	438·11	454·22
6. Cost per thousand gallons maintenance .. Annas	3·23	3·36	2·59	2·33	2·11	1·80	1·69	1·99	1·75	1·60	1·56
7. Total charges per thousand gallons .. "	4·95	5·31	4·09	4·38	3·11	3·96	2·44	2·40	2·64	2·50	2·39
8. Revenue in thousands— "											
(a) Unmetered .. .. .. Rupees	184·65	190·97	285·48	291·17	360·13	352·32	371·38	401·27	388·17	401·82	478·60
(b) Metered .. .. .. "	97·27	89·05	119·12	150·21	126·72	119·84	137·20	122·87	151·84	162·27	170·31
Total "	281·92	280·02	404·60	441·38	486·35	472·26	509·08	523·64	540·01	564·09	648·91
9. Receipt per thousand gallons through—											
(a) Metered supplies .. .. Annas	8·15	6·77	9·11	9·44	6·93	6·44	6·09	5·77	5·41	5·32	6·27
(b) Assessment and ferrule rating .. "	3·06	3·70	3·24	3·20	4·07	3·70	3·11	3·55	2·85	2·72	2·94
10. Profit or deficit in thousands .. Rupees	—75·78	—64·63	+20·85	—26·94	+154·98	+21·31	+162·03	+202·04	+106·06	+125·98	+194·69

* Figures supplied by the Superintendent water-works.

MEERUT WATER-WORKS

Particulars	Years										
	1922-23	1923-24	1924-25	1925-26	1926-27	1927-28	1928-29	1929-30	1930-31	1931-32	1932-33
1. Quantity of water consumed—											
(a) Metered .. .. Million gallons.	194·462	160·989	22·315	11·518	12·047	13·769	17·092	18·692	32·854	18·032	17·217
(b) Unmetered .. .. "	325·032	278·593	349·900	360·015	369·055	395·237	402·080	406·407	420·748	465·719	469·807
Total "	519·494	439·582	372·215	371·533	381·102	409·006	419·172	425·099	453·602	483·751	487·024
2. Consumption per head per day in gallons ..	11·81	9·80	8·31	13·10	13·43	14·38	14·78	14·99	15·99	14·50	14·63
3. Number of connections—											
(a) Metered	29	24	31	31	31	34	34	37	38	39	40
(b) Unmetered	1,042	1,160	1,430	1,529	1,622	1,695	1,785	1,877	1,965	2,066	2,034
Total ..	1,071	1,184	1,461	1,560	1,653	1,729	1,819	1,914	2,003	2,105	2,074
4. Number of standposts	140	140	138	138	137	138	136	136	140	148	174
5. Expenditure in thousands—											
(a) Maintenance .. .. .. Rupees	55·81	52·11	41·96	35·73	37·45	43·72	40·23	36·34	32·60	37·90	27·89
(b) Interest and sinking fund .. "	43·15	43·15	43·15	45·81	18·83	..	..	..	..	..	..
Total "	98·96	95·26	85·11	81·54	56·28	43·72	40·23	36·34	32·60	37·90	27·89
6. Cost per thousand gallons maintenance .. Annas	1·72	1·90	1·80	1·54	1·57	1·71	1·54	1·37	1·15	1·25	0·92
7. Total charges per thousand gallons .. "	3·05	3·47	3·65	3·51	2·36	1·71	1·54	1·37	1·15	1·25	0·92
8. Revenue in thousands—											
(a) Unmetered .. .. .. Rupees	8·98	8·47	12·53	23·49	25·41	24·28	23·89	25·51	26·93	29·39	30·42
(b) Metered .. .. .. "	47·88	50·37	7·91	34·52*	29·04†	4·09	5·32	8·84	5·94	5·47	6·71
Total "	56·36	58·84	20·44	58·01	54·45	28·37	29·11	34·35	32·87	34·86	37·13
9. Receipt per thousand gallons through—											
(a) Metered supplies .. .. Annas	3·94	5·01	5·67	3·10	7·37	4·75	4·89	7·56	2·89	4·85	6·24
(b) Assessment and ferrule rating	0·44	0·49	0·57	1·04	1·10	0·98	0·95	1·00	1·02	1·01	1·04
10. Profit or deficit in thousands .. Rupees	−42·10	−36·42	−64·67	−23·53	−1·83	−15·35	−11·12	−1·99	+0·27	−3·04	+9·24

* Includes Rs 32,296 Government grant and compensation from Cantonments.
† Includes Rs.23,500 Government grant as compensation from Cantonments.

MUSSOORIE WATER-WORKS

Particulars	Years										
	1922-23	1923-24	1924-25	1925-26	1926-27	1927-28	1928-29	1929-30	1930-31	1931-32	1932-33
1. Quantity of water consumed—											
(a) Metered .. .. Million gallons	17·701	12·859	24·201	30·115	30·068	28·558	27·212	42·019	46·381	52·592	53·838
(b) Unmetered .. .. "	72·801	68·699	54·456	57·498	65·760	71·129	79·768	77·264	66·626	76·699	70·439
Total "	90·502	81·558	78·657	87·613	95·828	99·767	106·980	119·283	115·007	129·291	124·277
2. Consumption per head per day in gallons.. ..	16·22	14·57	14·09	16·19	17·17	17·83	19·17	21·37	20·61	27·05	26·08
3. Number of connexions—											
(a) Metered	377	430	428	474	446	471	474	481	498	524	608
(b) Unmetered	*Nil	*28	*46	*50	*76	*59	59	155	16	16	24
Total ..	377	458	494	524	522	530	533	636	514	540	632
4. Number of standposts	49	49	49	49	49	49	52	52	59	65	92
5. Expenditure in thousands—											
(a) Maintenance .. .. .. Rupees	49·89	41·95	39·10	44·08	61·57	57·19	65·12	73·22	71·71	84·00	82·19
(b) Interest and sinking fund.. .. "	33·00	32·98	37·40	17·16	16·61	28·58	28·83	28·83	23·83	41·64	41·64
Total "	82·89	74·93	76·50	61·24	78·18	86·02	93·95	102·05	100·54	125·64	123·83
6. Cost per thousand gallons maintenance .. Annas	8·82	8·23	7·95	8·05	10·28	9·17	9·74	9·82	9·95	10·40	10·58
7. Total charges per thousand gallons .. "	14·65	14·70	15·55	11·18	13·05	13·79	14·05	13·69	13·99	15·55	15·94
8. Revenue in thousands—											
(a) Unmetered .. .. .. Rupees	48·20	48·28	46·32	10·33	3·57	9·12	6·25	46·37	5·79	13·07	12·36
(b) Metered .. .. .. "	12·95	14·30	14·32	49·95	50·15	48·40	61·14	39·48	78·22	83·95	81·52
Total "	61·15	57·58	60·64	60·31	53·72	57·62	67·39	83·15	84·01	97·02	93·88
9. Receipt per thousand gallons through—											
(a) Metered supplies .. .. Annas	11·76	17·50	9·47	26·58	25·69	27·09	35·95	15·04	25·57	25·54	24·23
(b) Assessment and ferrule rating .. "	10·59	10·67	13·61	2·83	2·63	2·05	1·25	0·00	1·39	2·73	2·31
10. Profit or deficit in thousands .. .. Rupees	—21·74	—17·40	—15·86	—0·93	—19·46	—28·40	—26·56	—15·90	—16·53	—23·62	—29·95

* Figures taken from the Board's Annual Administration Reports.
Figures for standposts supplied by the Electrical Engineer.

NAINI TAL WATER-WORKS

Particulars		Years										
		1922-23	1923-24	1924-25	1925-26	1926-27	1927-28	1928-29	1929-30	1930-31	1931-32	1932-33
1. Quantity of water consumed—												
(a) Metered	Million gallons	14·288	14·020	16·746	17·686	18·221	17·847	19·735	18·922	18·666	21·219	19·788
(b) Unmetered	"	37·003	20·939	36·799	29·424	26·740	34·763	41·480	44·674	49·994	50·561	50·669
Total	"	51·241	34·959	53·545	47·060	44·961	52·615	61·215	63·596	68·660	71·780	70·457
2. Consumption per head per day in gallons		8·10	5·51	8·47	7·44	7·11	8·33	9·68	10·06	10·86	13·26	13·05
3. Number of connexions—												
(a) Metered		300	284	296	317	305	313	330	354	367	373	395
(b) Unmetered		*5	5	5	5	6	5	5	5	7	7	7
Total	..	305	289	301	322	311	318	335	359	374	380	402
4. Number of standposts		24	78	72	72	72	72	72	72	72	70	73
5. Expenditure in thousands—												
(a) Maintenance	Rupees	39·40	32·11	43·43	44·17	46·72	40·61	47·73	47·33	43·08	59·98	59·30
(b) Interest and sinking fund ..	"	23·01	23·01	23·02	23·01	25·59	25·59	25·59	25·59	25·59	25·59	25·59
Total	"	112·41	105·12	66·45	67·18	72·31	66·20	73·32	72·92	68·67	85·57	84·89
6. Cost per thousand gallons maintenance ..	Annas	27·91	27·58	12·98	15·02	16·62	12·35	12·47	11·90	10·04	13·37	13·47
7. Total charges per thousand gallons ..	"	35·10	48·11	19·85	22·84	25·73	20·13	19·16	18·34	16·00	19·07	19·28
8. Revenue in thousands—												
(a) Unmetered	Rupees	44·39	45·95	46·91	47·36	47·32	48·00	50·91	52·36	59·99	50·91	64·02
(b) Metered	"	22·49	21·98	28·79	33·09	30·28	30·49	34·59	35·12	32·95	35·13	34·76
Total	"	66·88	67·93	75·70	80·95	77·60	78·49	85·50	87·48	92·94	95·04	98·78
9. Receipt per thousand gallons through—												
(a) Metered supplies	Annas	25·27	25·08	27·50	30·00	26·59	27·38	28·04	29·69	28·25	26·49	28·11
(b) Assessment and ferrule rating ..	"	19·19	35·11	20·39	23·03	28·32	22·00	19·64	18·78	19·20	18·96	20·22
10. Profit or deficit in thousands ..	Rupees	−45·53	−37·19	+9·25	+13·77	+5·29	+12·29	+12·18	+14·56	+24·27	+9·47	+13·89

*Figure taken from the Board's Annual Administration Reports.
Figures for standposts supplied by the Electrical and Mechanical Engineer.

DEHRA DUN WATER-WORKS

Particulars	Years										
	1922-23	1923-24	1924-25	1925-26	1926-27	1927-28	1928-29	1929-30	1930-31	1931-32	1932-33
1. Quantity of water consumed—											
(a) Metered .. .. Million gallons	1·352	1·175	1·313	1·221	1·778	3·565	6·240	5·878	7·550	7·897	10·800
(b) Unmetered .. .. .. "	64·558	64·735	64·418	64·510	108·222	106·435	103·760	104·122	102·450	102·404	99·200
Total "	65·910	65·910	65·731	65·731	110·000	110·000	110·000	110·000	110·000	110·301	110·000
2. Consumption per head per day in gallons ..	5·29	5·28	5·28	5·28	8·84	8·82	8·84	8·84	8·84	7·46	7·46
3. Number of connexions—											
(a) Metered	14	14	13	12	29	37	54	55	54	57	57
(b) Unmetered	3	3	4	4	4	4	4	2	2	1	1
Total ..	17	17	17	16	33	41	58	57	56	58	58
4. Number of standposts	12	12	12*	12*	84*	87*	95*	95*	96	96	96
5. Expenditure in thousands—											
(a) Maintenance .. .. .. Rupees	8·98	6·41	6·08	6·59	7·06	10·06	7·92	8·93	9·29	10·19	9·94
(b) Interest and Sinking Fund .. "	7·50	7·95	7·51	7·49	26·84	19·87	12·67	12·87	12·87	12·87	12·87
Total "	16·48	14·36	13·59	14·38	33·92	29·93	20·79	21·80	22·10	23·06	22·81
6. Cost per thousand gallons maintenance .. Annas	2·18	1·55	1·43	1·63	1·03	1·46	1·15	1·30	1·34	1·48	1·45
7. Total charges per thousand gallons .. "	4·00	3·45	3·31	3·50	4·98	4·35	3·02	3·17	3·21	3·34	3·32
8. Revenue in thousands—											
(a) Unmetered .. .. .. Rupees	..	..	..	0·04	0·57	1·68	1·97	3·64	1·84	2·08	5·23
(b) Metered .. .. .. "	2·70	2·51	2·74	2·60	3·86	7·59	10·22	9·33	10·60	10·60	14·19
Total "	2·70	2·51	2·74	2·64	4·43	9·27	12·19	13·48	12·44	13·68	19·42
9. Receipt per thousand gallons through—											
(a) Metered supplies .. .. Annas	32·00	34·15	33·35	34·07	34·74	34·05	26·21	26·74	22·45	21·47	21·01
(b) Assessment and ferrule rating .. "	..	..	..	0·01	0·03	0·25	0·50	0·56	0·29	0·47	0·34
10. Profit or deficit in thousands.. .. Rupees	—13·78	—11·85	—10·85	—11·74	—29·49	—20·66	—8·60	—8·84	—9·66	—9·48	—3·39

* Figures supplied by the Chairman, Municipal Board.

JHANSI WATER-WORKS.

Particulars	Years										
	1922-23	1923-24	1924-25	1925-26	1926-27	1927-28	1928-29	1929-30	1930-31	1931-32	1932-33
1. Quantity of water consumed—											
(a) Metered .. Million gallons	11·673	2·906	3·072	2·108	3·744	3·110	3·019	3·605	3·288	3·052	3·243
(b) Unmetered .. .. "	53·528	55·103	44·044	50·050	42·349	45·678	39·958	49·274	55·390	57·342	61·063
Total "	65·201	57·909	47·116	52·158	46·093	48·788	42·977	52·879	58·678	60·394	64·306
2. Consumption per head per day in gallons ..	7·14	6·33	5·16	5·71	5·05	5·33	4·71	5·79	6·43	4·59	4·90
3. Number of connexions—											
(a) Metered	5	4	6	13	11	10	11	10	8	9	12
(b) Unmetered	38	45	45	55	45	49	59	69	81	101	125
Total ..	43	49	51	68	56	59	70	79	89	110	137
4. Number of standposts	19	19	20	20	23	23	23	26	32	40	45
5. Expenditure in thousands—											
(a) Maintenance .. .. Rupees	20·98	15·56	22·42	22·48	18·07	13·49	19·84	19·69	15·42	14·49	17·37
(b) Interest and Sinking-Fund .. "	2·93	2·92	20·37	..	..	..	..	..	..	..	..
Total "	23·91	18·48	42·79	22·48	18·07	13·49	19·84	19·69	15·42	14·49	17·37
6. Cost per thousand gallons maintenance Annas	5·14	4·29	7·61	6·89	6·27	4·42	7·38	5·95	4·20	3·84	4·32
7. Total charge per thousand gallons .. "	5·86	5·10	14·52	6·89	6·27	4·42	7·38	5·95	4·20	3·84	4·32
8. Revenue in thousands—											
(a) Unmetered .. .. Rupees	7·46	7·23	8·05	11·16	13·50	13·51	14·41	14·01	14·33	16·10	19·26
(b) Metered .. .. .. "	0·30	0·93	0·02	1·90	1·58	1·45	1·90	1·53	1·62	1·43	2·04
Total "	7·76	8·16	8·07	13·06	15·08	14·96	16·31	15·54	15·95	17·53	21·30
9. Receipt per thousand gallons through—											
(a) Metered supplies .. .. Annas	0·41	5·32	0·10	14·48	6·55	7·44	10·06	6·79	7·87	7·51	10·05
(b) Assessment and ferrule rating "	2·22	2·09	2·92	3·57	5·10	4·73	5·77	4·55	4·14	4·49	5·05
10. Profit or deficit in thousands .. Rupees	—16·15	—10·32	—34·72	—9·42	—3·04	+1·47	—3·53	—4·15	+0·53	+3·04	+3·93

Figures for stand posts supplied by the Chairman, Municipal Board.

MIRZAPUR WATER-WORKS

Particulars	Years										
	1922-23	1923-24	1924-25	1925-26	1926-27	1927-28	1928-29	1929-30	1930-31	1931-32	1932-33
1. Quantity of water consumed—											
(a) Metere .. .. Million gallons	27·991	32·840	29·877	31·987	30·182	6·742	13·623	14·275	10·868	9·972	7·668
(b) Unmetered .. .. .. ,,	145·952	165·903	228·629	293·048	328·081	354·216	348·678	357·139	339·065	316·492	344·949
Total ,,	173·943	198·743	258·506	325·035	358·263	360·958	362·301	371·414	349·933	326·464	352·617
2. Consumption per head per day in gallons ..	12·41	14·13	18·44	23·18	25·56	25·68	25·85	26·10	24·97	20·89	22·62
3. Number of connexions—											
(a) Metered	507	295	117	121	129	206	73	77	80	38	9
(b) Unmetered	937	1,307	1,829	1,913	2,125	2,398	2,426	2,515	2,604	2,754	2,757
Total ..	1,444	1,602	1,946	2,034	2,254	2,539	2,499	2,592	2,684	2,792	2,766
4. Number of standposts	70	81	92	108	188	169	214	236	238	250	261
5. Expenditure in thousands—											
(a) Maintenance .. .. .. Rupees	10·80	11·56	12·49	13·54	11·33	14·66	10·50	11·25	7·61	4·57	5·29
(b) Interest and Sinking Fund .. ,,	23·01	23·01	23·01	22·99	22·99	22·99	21·73	21·79	21·79	21·79	21·79
Total ,,	33·81	34·57	35·50	36·53	34·32	37·65	32·23	33·04	29·40	26·36	27·08
6. Cost per thousand gallons maintenance .. Annas	0·99	0·93	0·77	0·67	0·51	0·65	0·46	0·48	0·35	0·22	0·24
7. Total charges per thousand gallons .. ,,	3·10	2·78	2·19	1·80	1·53	1·67	1·42	1·42	1·34	1·29	1·23
8. Revenue in thousands—											
(a) Unmetered .. .. .. Rupees	13·59	12·41	13·33	21·27	21·60	23·57	35·03	26·97	26·93	29·29	30·35
(b) Metered .. .. .. ,,	7·00	6·49	8·56	10·87	8·03	4·23	2·43	4·46	1·33	2·30	1·76
Total ,,	20·59	18·90	21·94	32·14	29·63	27·80	33·52	31·43	28·26	31·59	32·61
9. Receipt per thousand gallons through—											
(a) Metered supplies .. .. Annas	4·00	3·16	4·53	5·43	4·23	10·03	4·03	4·99	1·96	4·17	3·67
(b) Assessment and ferrule rating .. ,,	1·49	1·19	0·93	1·16	1·05	1·03	1·61	1·21	1·28	1·48	1·43
10. Profit or deficit in thousands .. .. Rupees	—13·22	—15·67	—13·56	—4·39	—4·64	—9·85	+6·29	—1·61	—1·14	+5·53	+5·53

MUTTRA WATER-WORKS

Particulars.	Years										
	1922-23	1923-24	1924-25	1925-26	1926-27	1927-28	1928-29	1929-30	1930-31	1931-32	1932-33
1. Quantity of water consumed—											
(a) Metered .. .. Million gallons	3·122	3·212	2·953	3·005	2·825	3·831	3·298	4·271	1·506	2·088	3·380
(b) Unmetered .. .. .. „	266·859	329·022	326·017	392·002	271·877	288·671	274·601	237·277	243·841	249·690	274·227
Total „	269·981	337·184	333·970	395·007	273·702	293·532	277·899	241·548	245·347	252·378	277·816
2. Consumption per head per day in gallons ..	17·34	21·60	21·79	25·38	17·60	18·82	17·83	15·58	15·77	11·00	12·80
3. Number of connexions—											
(a) Metered	22	9	11	12	9	20	26	23	18	18	48
(b) Unmetered	723	888	1,118	1,392	1,389	1,389	1,616	1,702	1,787	1,888	1,924
Total ..	745	897	1,129	1,404	1,398	1,409	1,642	1,725	1,805	1,906	1,972
4. Number of standposts	148	145	200	212	223	227	232	239	242	249	255
5. Expenditure in thousands—											
(a) Maintenance .. .. Rupees	39·97	47·06	34·80	35·07	49·37	46·22	61·40	53·82	56·35	64·06	64·44
(b) Interest and Sinking Fund .. „	10·96	10·97	10·96	10·96	10·97	10·97	10·97	18·35	18·35	18·35	18·35
Total „	50·93	58·03	45·76	46·03	60·34	57·19	72·37	72·17	74·70	82·41	82·79
6. Cost per thousand gallons maintenance Annas	2·56	2·23	1·64	1·42	2·89	2·19	3·54	3·57	3·67	4·06	3·71
7. Total charges per thousand gallons .. „	3·01	2·75	2·16	1·86	3·53	2·79	4·17	4·78	4·87	5·22	4·77
8. Revenue in thousands—											
(a) Unmetered .. .. .. Rupees	30·44	42·31	35·37	45·69	47·18	57·49	57·10	70·29	67·98	77·61	78·68
(b) Metered .. .. .. „	3·46	1·24	1·01	2·50	0·86	1·35	0·59	0·64	0·23	0·41	0·59
Total „	33·90	43·55	36·38	48·29	48·84	58·84	57·69	70·93	68·21	78·02	79·27
9. Receipt per thousand gallons through—											
(a) Metered supplies .. .. Annas	17·70	6·14	5·46	13·86	5·60	5·61	2·87	2·41	2·29	2·44	2·62
(b) Assessment and ferrule rating .. „	1·32	2·03	1·68	1·86	2·88	3·18	3·38	4·74	4·46	4·97	4·59
10. Profit or deficit in thousands .. Rupees	—17·03	—14·48	—9·38	+2·26	—11·50	+7·65	—14·68	—1·24	—6·49	—4·39	—3·52

FYZABAD WATER-WORKS

Particulars	Years										
	1922-23	1923-24	1924-25	1925-26	1926-27	1927-28	1928-29	1929-30	1930-31	1931-32	1932-33
1. Quantity of water consumed—											
(a) Metered .. .. Million gallons	..	..	..	1·179	5·596	8·216	9·406	9·619	10·585	10·901	12·082
(b) Unmetered .. .. "	..	..	..	67·025	122·724	145·036	131·567	139·477	150·520	172·411	201·893
Total "	..	..	..	68·204	128·323	153·252	140·973	149·096	161·105	183·312	213·975
2. Consumption per head per day in gallons ..	..	..	..	6·23	11·72	13·99	12·87	13·62	14·71	14·31	16·75
3. Number of connexions—											
(a) Metered	..	..	..	20	32	39	41	43	41	43	44
(b) Unmetered	..	..	..	589	756	841	921	993	1,138	1,218	1,328
Total ..	..	..	..	609	788	880	962	1,036	1,179	1,261	1,372
4. Number of standposts	..	..	..	94	95	96	102	103	107	110	111
5. Expenditure in thousands—											
(a) Maintenance .. .. .. Rupees	..	..	..	29·19	27·95	24·13	26·49	31·55	27·14	31·84	27·85
(b) Interest and Sinking Fund .. "	..	..	..	11·43	11·43	11·43	11·43	11·43	11·43	11·43	11·42
Total "	..	..	..	40·62	39·38	35·61	37·92	42·98	38·57	43·27	39·27
6. Cost per thousand gallons maintenance .. Annas	..	..	..	6·85	3·49	2·53	3·00	3·38	2·70	2·78	2·08
7. Total charges per thousand gallons .. "	..	..	..	9·53	4·91	3·72	4·30	4·61	3·83	3·78	2·94
8. Revenue in thousands—											
(a) Unmetered .. .. .. Rupees	..	..	..	13·14	36·58	36·33	33·44	35·80	40·59	43·61	44·45
(b) Metered .. .. .. "	..	..	..	0·24	1·65	5·55	8·38	2·08	1·46	1·10	1·69
Total "	..	..	..	13·38	38·23	42·38	38·82	37·88	42·05	44·71	46·14
9. Receipt per thousand gallons through—											
(a) Metered supplies .. .. Annas	..	..	..	3·31	4·71	10·81	14·23	3·33	2·20	1·61	2·24
(b) Assessment and ferrule rating .. "	..	..	..	3·13	4·77	4·05	3·70	4·11	4·31	4·05	3·52
10. Profit or deficit in thousands .. .. Rupees	..	..	..	—27·24	—1·15	+6·77	+0·90	—5·15	+3·48	+1·44	+6·87

NOTE.—This water-works started working from 1925.

HARDWAR WATER-WORKS

Particulars	Years										
	1922-23	1923-24	1924-25	1925-26	1926-27	1927-28	1928-29	1929-30	1930-31	1931-32	1932-33
1. Quantity of water consumed—											
(a) Metered .. .. Million gallons	..	..	..	..	0·085	1·045	1·785	2·610	3·048	2·489	1·867
(b) Unmetered .. .. ,,	..	..	..	..	6·202	32·776	44·833	84·988	83·538	78·199	84·015
Total ,,	..	..	..	..	6·287	33·821	46·173	87·598	86·586	80·688	85·882
2. Consumption per head per day in gallons ..	..	..	..	..	..	10·24	14·02	26·59	26·29	19·10	20·40
3. Number of connexions—											
(a) Metered	..	..	..	..	1	4	13	18	18	14	22
(b) Unmetered	..	..	..	..	25	96	135	179	185	196	219
Total ..	..	..	..	..	26	100	148	192	198	210	241
4. Number of standposts	..	..	..	..	37	36	40	44	47	48	96*
5. Expenditure in thousands—											
(a) Maintenance .. .. .. Rupees	..	..	..	..	5·84	18·58	20·84	25·78	27·02	21·29	22·58
(b) Interest and Sinking Fund .. ,,	..	..	..	..	11·42	11·42	11·42	11·42	11·42	11·42	11·42
Total ,,	..	..	..	..	17·26	30·00	32·26	37·20	38·44	32·81	33·95
6. Cost per thousand gallons maintenance.. Annas	..	..	..	..	14·85	8·79	7·22	4·71	4·99	4·24	4·20
7. Total charges per thousand gallons .. ,,	..	..	..	..	43·92	14·19	11·18	6·79	7·10	6·51	6·33
8. Revenue in thousands—											
(a) Unmetered .. .. .. Rupees	..	..	..	..	..	2·37§	46·58	59·60	56·39	50·41	52·25
(b) Metered .. .. .. ,,	..	..	..	..	..	0·61	0·86	1·74	2·02	2·00	1·54
Total ,,	..	..	..	..	..	2·98	47·44	61·34	58·41	52·41	53·79
9. Receipt per thousand gallons through—											
(a) Metered supplies .. .. Annas	..	..	..	..	..	9·38	7·70	10·65	10·60	13·13	13·20
(b) Assessment and fermle rating .. ,,	..	..	..	..	..	1·16	16·79	11·27	10·80	10·31	9·95
10. Profit or deficit in thousands .. Rupees	..	..	..	..	..	—27·02	+15·18	+24·14	+19·97	+19·60	+19·84

§ Does not include Rs.30,000 receipt from Fair Fund.
Figures for standpost supplied by the Electrical and Water-works Engineer.
* Increase is due to Adh-Kumbh Mela this year.
NOTE—This water-works started working from 1926.

UNAO WATER-WORKS

Particulars	Years										
	1922-23	1923-24	1924-25	1925-26	1926-27	1927-28	1928-29	1929-30	1930-31	1931-32	1932-33
1. Quantity of water consumed—											
(a) Metered .. .. Million gallons	..	..	..	..	..	..	0·039	0·560	1·037	0·700	0·913
(b) Unmetered .. .. .. "	..	..	..	..	..	13·732	34·933	40·657	54·343	49·992	56·636
Total "	..	..	..	..	..	13·732	34·925	41·217	55·330	50·692	57·549
2. Consumption per head per day in gallons ..	..	..	..	..	..	5·87	10·63	12·55	16·86	10·65	12·13
3. Number of connexions—											
(a) Metered	..	..	..	..	..	..	1	2	2	2	10
(b) Unmetered	..	..	..	..	..	94	161	161	161	208	216
Total ..	..	..	..	..	..	94	162	163	163	210	226
4. Number of standposts	..	..	..	..	..	46	49	50	51	51	60
5. Expenditure in thousands—											
(a) Maintenance .. .. Rupees	..	..	..	..	..	4·51	6·90	7·39	8·36	7·18	10·16
(b) Interest and Sinking Fund .. "	..	..	..	..	..	..	..	..	..	..	..
Total "	..	..	..	..	..	4·51	6·90	7·39	8·36	7·18	10·16
6. Cost per thousand gallons maintenance .. Annas	..	..	..	..	..	5·26	3·16	2·87	2·41	2·27	2·82
7. Total charges per thousand gallons .. "	..	..	..	..	..	5·26	3·16	2·87	2·41	2·27	2·82
8. Revenue in thousands—											
(a) Unmetered .. .. .. Rupees	..	..	..	..	..	1·52	7·40	8·19	6·70	6·97	10·31
(b) Metered .. .. .. "	..	..	..	..	..	..	0·17	0·23	0·57	0·68	0·75
Total "	..	..	..	..	..	1·52	7·57	8·42	7·27	7·65	11·06
9. Receipt per thousand gallons through—											
(a) Metered supplies .. .. Annas	..	..	..	..	..	..	29·52	6·63	8·76	15·50	13·23
(b) Assessment and ferrule rating .. "	..	..	..	..	..	1·77	3·40	3·29	1·97	2·23	2·91
10. Profit or deficit in thousands.. .. Rupees	..	..	..	..	..	−2·99	+0·67	+1·03	−1·09	+0·47	+0·90

NOTE—This water-works started working from 1927.

KOSI WATER-WORKS

Particulars	Years										
	1923-23	1923-24	1924-25	1925-26	1926-27	1927-28	1928-29	1929-30	1930-31	1931-32	1932-33
1. Quantity of water consumed—											
(a) Metered .. .. Million gallons	..	..	..	..	..	..	..	..	0·473	0·698	0·748
(b) Unmetered .. .. .. "	..	..	..	..	..	..	..	..	14·755	17·983	23·198
Total "	..	..	..	..	..	..	..	..	15·228	18·681	23·946
2. Consumption per head per day in gallons ..	..	..	..	..	..	..	..	..	6·18	7·00	8·99
3. Number of connexions—											
(a) Metered	..	..	..	..	..	..	..	..	4	11	14
(b) Unmetered	..	..	..	..	..	..	..	..	2	2	5
Total ..	..	..	..	..	..	..	..	..	6	13	19
4. Number of standposts	..	..	..	..	..	..	..	..	23	23	27
5. Expenditure in thousands—											
(a) Maintenance .. .. .. Rupees	..	..	..	..	..	..	..	..	6·37	4·84	5·16
(b) Interest and Sinking Fund .. "	..	..	..	..	..	..	..	..	..	..	..
Total "	..	..	..	..	..	..	..	..	6·37	4·84	5·16
6. Cost per thousand gallons maintenance .. Annas	..	..	..	..	..	..	..	..	6·69	4·14	3·44
7. Total charges per thousand gallons .. "	..	..	..	..	..	..	..	..	6·69	4·14	3·44
8. Revenue in thousands—											
(a) Unmetered .. .. .. Rupees	..	..	..	..	..	..	..	..	8·79	8·28	7·73
(b) Metered .. .. .. "	..	..	..	..	..	..	..	..	0·28	0·14	0·12
Total "	..	..	..	..	..	..	..	..	9·07	8·42	7·85
9. Receipt per thousand gallons through—											
(a) Metered supplies .. .. Annas	..	..	..	..	..	..	..	..	9·54	3·16	2·65
(b) Assessment and furnie rating .. "	..	..	..	..	..	..	..	..	9·53	7·37	5·33
10. Profit or deficit in thousands .. .. Rupees	..	..	..	..	..	..	..	..	+2·70	+3·58	+2·69

NOTE—This water-works started working from 1929.

FATEHPUR-SIKRI WATER-WORKS

Particulars	Years										
	1922-23	1923-24	1924-25	1925-26	1926-27	1927-28	1928-29	1929-30	1930-31	1931-32	1932-33
1. Quantity of water consumed—											
(a) Metered .. .. Million gallons	..	..	..	..	..	..	..	..	..	..	..
(b) Unmetered .. .. .. "	..	..	..	..	..	..	..	..	10·713	12·606	14·857
Total "	..	..	..	..	..	..	..	..	10·713	12·606	14·857
2. Consumption per head per day in gallons ..	..	..	..	..	..	..	..	..	6·67	5·60	6·62
3. Number of connexions—											
(a) Metered	..	..	..	..	..	..	..	..	..	..	..
(b) Unmetered	..	..	..	..	..	..	..	..	..	..	..
Total ..	..	..	..	..	..	..	..		..	..	..
4. Number of standposts	..	..		..	..	..	..	..	21	*26	35
5. Expenditure in thousands—											
(a) Maintenance ... . Rupees	..	..	..	..	..	..	..	..	3·16	3·15	3·86
(b) Interest and Sinking Fund .. "	..	..	..	..	..	..	..	..	..	..	..
Total "	..	..	..	..	..	..	..	..	3·16	3·15	3·86
6. Cost per thousand gallons maintenance .. Annas	..	..	..	..	..	..	..	..	4·72	4·00	4·16
7. Total charges per thousand gallons .. "	..	..	..	..	..	..	..	..	4·72	4·00	4·16
8. Revenue in thousands—											
(a) Unmetered .. .. .. Rupees	..	..	..	..	..	..	..	..	..	1·91	1·02
(b) Metered .. .. .. "	..	..	..	..	..	..	..	..	..	..	..
Total "	..	..	..	..	..	..	..	..	..	1·31	1·02
9. Receipt per thousand gallons through—											
(a) Metered supplies .. .. Annas	..	..	..	..	..	..	..	..	..	..	..
(b) Assessment and ferrule rating .. "	..	..	..	..	..	..	..	..	..	2·43	1·10
10. Profit or deficit in thousands.. .. Rupees	..	..	..	..	..	..	..	..	—3·16	—1·24	—2·84

* Includes four tanks for Mela water supply.

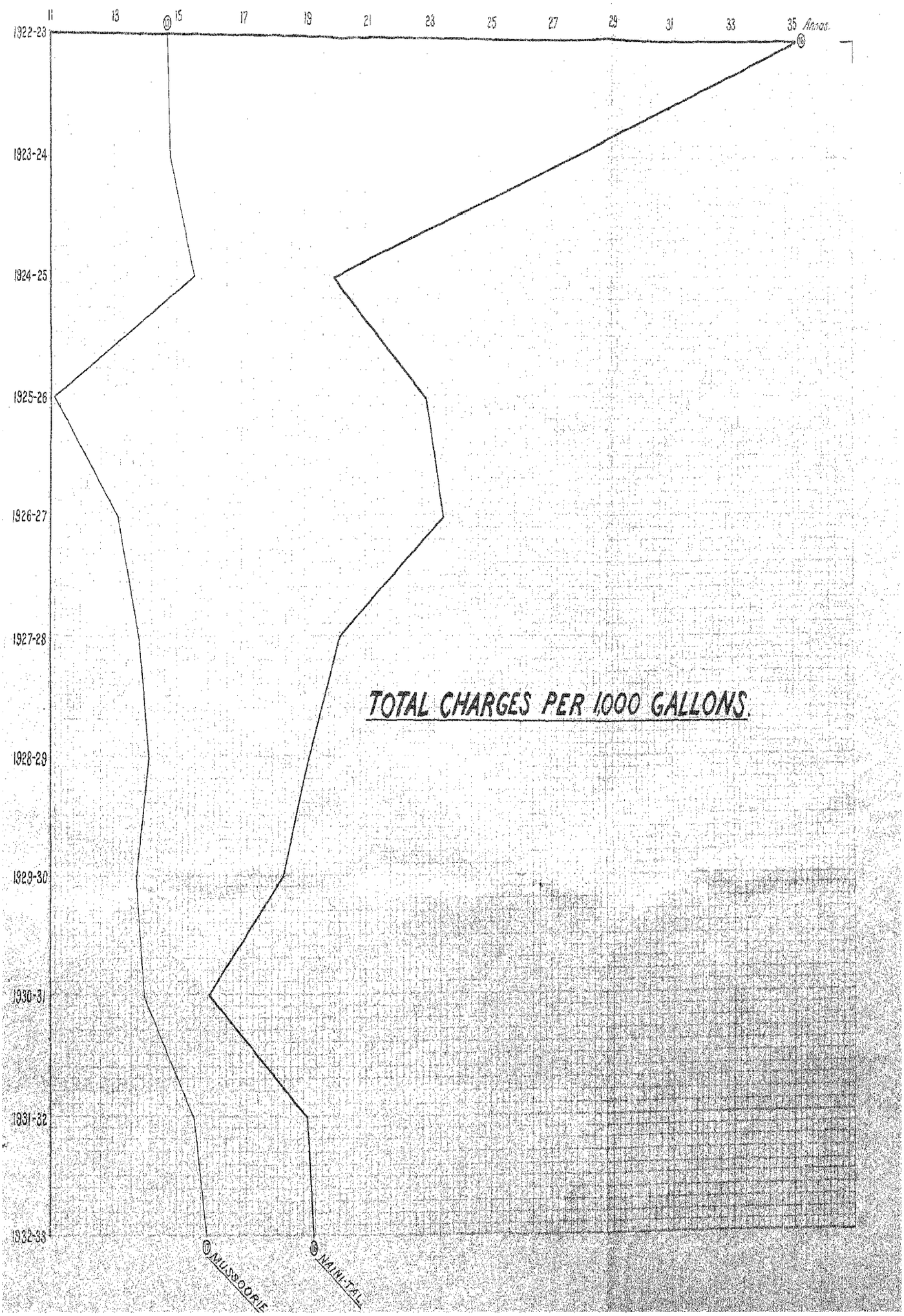
NOTE—This water-works started working from 1930.

ALIGARH WATER-WORKS

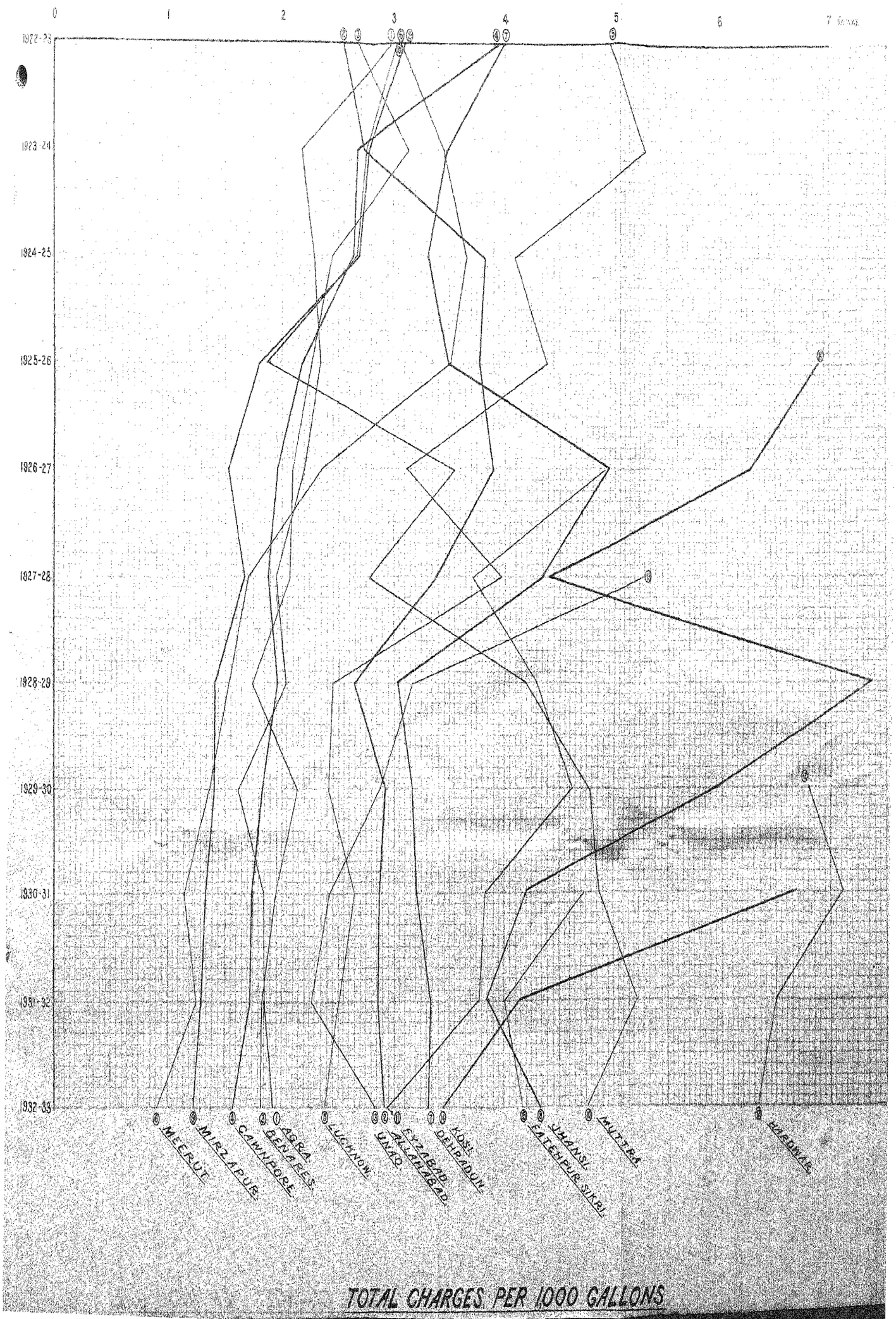
Particulars.	Years										
	1922-23	1923-24	1924-25	1925-26	1926-27	1927-28	1928-29	1929-30	1930-31	1931-32	1932-33
1. Quantity of water consumed—											
(a) Metered .. .. Million gallons.	..	..	..	..	..	..	..	..	..	..	..
(b) Unmetered .. .. .. "	..	..	..	..	..	..	..	..	16·320	65·797	111·253
Total "	..	..	..	..	..	..	..	..	16·320	65·797	111·253
2. Consumption per head per day in gallons ..	..	..	..	..	..	..	..	..	1·90	5·14	8·71
3. Number of connexions—											
(a) Metered	..	..	..	..	..	..	..	..	..	..	..
(b) Unmetered	..	..	..	..	..	..	..	..	..	394	657
Total ..	..	..	..	..	..	..	..	..	..	394	657
4. Number of standposts	..	..	..	..	..	..	..	..	101	102	103
5. Expenditure in thousands—											
(a) Maintenance .. .. .. Rupees	..	..	..	..	..	..	..	..	5·33	17·97	29·07
(b) Interest and Sinking Fund .. "	..	..	..	..	..	..	..	..	22·63	38·28	38·28
Total "	..	..	..	..	..	..	..	..	27·96	56·25	67·35
6. Cost per thousand gallons maintenance .. Annas	..	..	..	..	..	..	..	..	5·22	4·37	4·18
7. Total charges per thousand gallons .. "	..	..	..	..	..	..	..	..	27·41	13·68	9·69
Revenue in thousands—											
(a) Unmetered .. .. .. Rupees	..	..	..	..	..	..	..	..	..	5·33	14·26
(b) Metered .. .. .. "	..	..	..	..	..	..	..	..	..	..	..
Total "	..	..	..	..	..	..	..	..	..	5·33	14·26
9. Receipt per thousand gallons through—											
(a) Metered supplies .. .. Annas	..	..	..	..	..	..	..	..	..	..	..
(b) Assesment and ferrule rating .. "	..	..	..	..	..	..	..	..	..	1·30	2·05
10. Profit or deficit in thousands .. .. Rupees	..	..	..	..	..	..	..	..	—27·96	—50·92	—53·09

NOTE—This water-works started working from 1930.

COST OF WATER



COST OF WATER



TOTAL CHARGES PER 1,000 GALLONS

THIRTY-SEVENTH ANNUAL REPORT

OF THE

SUPERINTENDING ENGINEER

PUBLIC HEALTH DEPARTMENT
UNITED PROVINCES

FOR THE YEAR ENDED MARCH 31, 1932

ALLAHABAD:
THE SUPERINTENDENT, PRINTING AND STATIONERY, UNITED PROVINCES
1933

Thirty-seventh Annual Report of the Superintending Engineer, Public Health department, United Provinces, for the year ended March 31, 1932.

THE outstanding feature of this year's work has been the cutting down of all possible expenditure. In the budget allotment for the establishment of this department amounting to Rs. 3,27,800, a total saving of about Rs. 20,000 was planned in June, 1931, and soon afterwards realized. In addition thereto, a further saving of Rs. 19,000 odd was arrived at by exercising every possible restriction, which did not have untoward consequences.

The steps which resulted in these savings will result in still greater savings in coming years. For instance a reduction of Rs. 65,000 has been possible in the present year's budget owing to the measures referred to above.

In pursuance of the policy of retrenchment, all those project works for which funds could not be definitely promised by the local authorities concerned, were dropped and only the more urgent works for which funds were forthcoming received any attention at the hands of the staff.

The following staff has been brought under reduction :—

Actual reduction in staff.

Assistant Engineers	2
Subordinates	9
Draftsmen	6
Clerks	10
Peons	2

In spite of this curtailment in activities the year has been a very busy one. Correspondence with local authorities has increased and many schemes of reorganization and retrenchment have, in the process of their very discussion, been the cause of considerable extra labour.

Those duties which have been undertaken by the department, the value of which can be indicated to some extent in terms of money, are given in the attached table :—

Item no.	Nature of works.	Amount involved in lakhs of rupees.	Remarks.
1	Duties under the Local Authorities Loans Acts, 1914, and the Municipalities Act, 1916, i.e., the supervision and inspection of all open water-works and drainage pumping stations.	64·30	This amount represents the turnover in revenue and expenditure on water-supply, drainage and electric supply and is made up as follows :—
2	Local Works :—		
	(a) Preparation of projects ..	12·32	Includes 18 detailed proposals and two preliminary estimates.
	(b) Construction	3·31	Payments made.
3	Provincial Works :—		
	(a) Preparation of projects ..	4·94	9 detailed projects.
	(b) Construction	0·39	Payments made.
	(c) Maintenance	0·10	Lucknow anti-malarial and Allahabad Magh Mela maintenance.
4	(a) Advice free to local authorities ..	25·36	11 forecasts of cost with report supplied free.
	(b) Advice free for provincial works ..	0·32	1 forecast of cost with report supplied free.
5	Board of Public Health business :—		
	(a) Examination of projects for urban works.	3·76	13 projects were scrutinized.
	(b) Examination of projects for rural sanitation.	5·38	2,176 projects were examined.
	(c) Checking progress on urban and rural area G. O's nos. 468/XI, dated February 6, 1931, 470/XI, dated February 6, 1931, 580/XI, dated February 11, 1931, 483/XI, dated April 9, 1931, and 490/XI, dated April 9, 1931.	2·03	Progress reports collected and consolidated for the Board of Public Health.
6	Examination of projects for provincial works.	0·47	5 projects examined.
7	Inspection and reports on works carried out by local bodies.	3·99	

—	Revenue.	Expenditure	Total.
	Rs.	Rs.	Rs.
Water works.	27,57,264	22,54,718	50,11,982
Drainage.	59,897	71,298	1,31,195
Electric supply.	6,78,794	6,08,287	12,87,081
GRAND TOTAL.	34,95,955	29,34,303	64,30,258

The total value of projects including preliminary proposals and forecasts of cost which have been prepared during the year under report comes to Rs. 42·94 lakhs, while construction carried out amounts in value to Rs. 3·70 lakhs.

Of the seven items given in above table, fees are recoverable only on item 2. During the year an amount of Rs. 21,770 was earned as fees on project work completed, against an amount of Rs. 17,272 realized. Including the arrears of the previous year a sum of Rs. 40,198 was realized as fees for the preparation of projects. Earnings for construction carried out by this department amounted to Rs. 46,388. Thus for local works a total sum of Rs. 86,586 was realized against Rs. 41,800 anticipated as recoveries in the budget.

Whilst schemes of re-organization, some of which envisaged amalgamation with other departments, were being examined, the time was thought opportune to draw up statements showing the value of work executed by this department and centage charges involved, as such a statement would offer an excellent basis of comparison with the work of other departments. For this purpose the quinquennium 1926—1930 was examined in detail and the actual cost to Government as shown by centage charges on the value of work undertaken is set forth in the table Appendix XVI. Consequent on G. O no. 2980/XI—64, dated September 19, 1931, which recognized that a large proportion of the establishment of this branch could not rightly be debited either to project preparation or construction, certain proportionate charges of the total establishment costs were required to be covered by fees. The columns of this table show the actual charges which Government meet in respect of the various works and these charges compare favourably with the scale of fees laid down.

This success with which the divisions operate and their low establishment is in no small manner due to careful project work and the system of contracts based on the lump sum or lump sum-cum-item rate system now universal in the department.

This system of carrying out work is applicable both to original works, repairs and maintenance and has been successfully developed for drainage works, water-supply, pumping and generating plant, electric supply and anti-malaria works and offers the following benefits :—

Excesses on works can almost entirely be avoided and liabilities can be limited; the offers of skilled contractors made under earnest deposit against damages, show where the estimates are likely to be exceeded before liabilities are incurred; account work is vastly simplified; labour in analysing rates and preparing standard schedules is rendered unnecessary; the budgeting for funds is facilitated by the pre-arranged programme of construction; disputes are rare; a class of expert contractors employing their own technical staff is created; private enterprise is encouraged and scope offered for educated Indians; and the maintenance of stores, stock accounts and workshops is rendered unnecessary.

On the other hand the projects and contract documents render imperative the employment of fully skilled and experienced engineers.

The contract system has now completely superseded the old departmental system of carrying out works and in notifications no. 1130/XI—747-E, dated April 29, 1926 and no. 1015/XI—91, dated April 3, 1930, this system has also been made applicable to local authorities for carrying out their own works.

There is incontrovertible evidence to show that this system of contract is of great benefit both in establishment charges for supervision and in the cost of work, but the local authorities are slow to take advantage of it. The duty of approving of tender forms prepared by local authorities has increased the work of the divisions without any corresponding increase in the amount of fees earned. The tender forms submitted by local authorities are generally such as cannot be approved of without modification and in some cases without complete redrafting.

WATER SUPPLY, GENERAL.

The budgets which are received from the various local authorities in connection with their public works are in many cases inordinately delayed. The revised budgets of some boards have even been submitted to this office after the end of the financial year to which they pertain.

The average time taken by local authorities to answer a simple inquiry is much longer than is necessary, and some boards are so dilatory that it is hopeless to attempt to deal with them.

Proper attention is not paid by many boards to the appointment and dismissal of the establishment employed on the work, such affairs being dealt with in many cases without reference to the sanctioning authority as laid down by Government.

The staff appointed also in many instances are not qualified and are not of the standing to create confidence or who can act as leaders where progress is desirable. Some municipalities do not welcome inspection by officers of the departments, and it is felt, prevent their staff freely exchanging views with, or rendering information to, the inspecting officers.

It is difficult to justify this attitude where it exists, as inspecting officers are solely concerned with sound work being carried out in the most economical fashion possible.

An alarming aspect of the water-supply operations of the local authorities is that afforded by the majority who permit private connections in a reckless manner, without making any arrangements for the shortage concomitant thereon. Cases have occurred where local authorities have pressed for service reservoirs to be constructed and pipe lines to be laid, whilst large areas for which they are responsible remain without water during the dry months.

The demand (or rather the wasteful absorption) has become so great in most municipalities that the extensive reorganization works undertaken a few years ago have already been rendered insufficient; units are being used for longer hours than designed without adequate standby, which results in precarious conditions.

In some places the railway authorities and the cantonments, who, though not the worst sufferers by any means, have decided to cut themselves off completely from municipal systems and instal their own water works. This procedure which is forced on the large consumers mentioned above, causes no concern to the boards. They fail to see that additional systems which have to be constructed result in a higher charge for water per thousand gallons being necessary, and forget that the capital to inaugurate these supplies must be found by the general tax-payer.

They completely fail to see that co-operation with such large consumers can only result in mutual benefit of all parties and in lowering the charge of water to the public.

The measures of economy which the local authorities are apt to put in hand are often not best designed to that purpose. Large cuts in the pay of staff cause discontent and the starving of budgets as regards repairs and materials, results in far greater loss and injury to the plant than any savings which can be accomplished.

Automatic recording apparatus which in many instances indicates the instantaneous amount of water flowing as well as the total quantity delivered over a period of time, has been provided at many of the pumping stations in the province, so that there may be accurate records available of the rate of increase of consumption and so that there may be some check on the fuel and power charges. It is remarkable that in many instances this recording apparatus is not kept in working order. Sometimes there is not a sufficient supply of paper diagrams, sometimes it is said the mechanism is at fault. In all cases the complacency with which such a state of affairs is viewed is astonishing. The maintenance of such records is strictly analogous to the accounts which a cashier maintains in making disbursements, for water represents money and the larger municipalities pass water over gauging weirs worth several rupees for each minute the flow continues.

Very few boards possess the courage to tackle that greatest and indeed overwhelming loss, namely waste of water. The most ingenious objections are put forward against metering and when distress is reported the board employ their staff in searching the area where shortage is reported; meters, air valves or other fittings and sometimes extra pipes are laid there, whilst those areas where the pressure is high and the supply continuous and wasting consumers numerous, are ignored.

The hill municipalities and Cawnpore are very creditable exceptions who realize the value of water.

In recent years the use of an inferior type of galvanised iron piping has slowly crept into vogue and is now in extensive use in many municipalities. The only advantage it offers is cheapness in first cost, but its use is pernicious and is responsible for much loss of water. Samples which have been collected by the Mechanical Adviser during his inspections show clearly the inferiority of this material and small lengths which have been in use only for a few years exhibit porosity and rust. Those local authorities who permit the use of such material which does not comply with the standards laid down have themselves to blame for the grievous loss made inevitable by its use.

Hardwar Union and Lucknow municipality report the lowest amount of outstandings, the percentage of arrears to total demand being respectively 1·05 and 1·70.

The largest amount of arrears is recorded by Unao, over 41 per cent., followed by Mirzapur 38·09 per cent. and Fatehpur-Sikri 29·93 per cent. There is some excuse for Fatehpur-Sikri whose assessments have only recently been completed.

The arrears at Agra and Benares are by far the largest of all the large municipalities, amounting to 34 per cent. and 29 per cent., respectively, for which there is no excuse.

During the year many cases were brought to the notice of the Board of Public Health where local authorities failed to take timely or proper action in cases of defects reported by the Mechanical Adviser.

There are cases where boards utterly fail to recognize the value of technical advice rendered by experienced officers. One board when its attention was drawn to the dangerous depletion of the sand in its filter beds, appointed a committee consisting of two gentlemen who possessed academic qualifications in arts and law, to advise them.

In another case a board having dismissed its Water-works superintendent permitted one of its officials with no experience or qualifications as Water-works Superintendent, and the head clerk of his office, to undertake the duties of maintenance with dire results as far as expensive plant was concerned.

Drainage, general.

Some boards show great remissness in permitting private connections to be made to the public sewers without proper intercepting traps. This custom results in sewer gases entering the dwellings. This procedure discredits the system of sewerage by making it noxious instead of beneficial.

The shortage of water in many municipalities and intermittency of the supply militates largely against an increase in the use of sanitary fittings and private connections to sewers. In this way the benefit of much money sunk years ago in constructing main and sub-main sewers is lost to the public.

Encroachments are universally reported; no sooner is a building line set out than it is built over and the roadside drains become covered with *chabutras* and stalls. Cases are even on record where the storm water channels have been built upon and storm water diverted in such a manner as to cause flooding. In order that assistance may not be given to boards who do not take diligent care of their roadside property the Board of Public Health have recently refused to grant assistance without suitable guarantees from the local authorities to preserve their boundaries.

The secrecy with which some authorities manage their business and the delays involved leave no doubts that the tax-payers interests are the last to receive consideration.

Operations of local authorities and other works.

AGRA.

Water works maintenance.—Since last year's report the spare parts recommended for the steam and oil engines and the centrifugal pumps were obtained and the sets were overhauled and reconditioned.

A new steam economiser is in operation with resulting saving in fuel. The beam pumping sets, though forty-three years of age in continuous service, still function satisfactorily.

The bed plates of the new electro-motor vertical spindle raw water pumps, which Mechanical Adviser objected to, were replaced by the contractors. The old steam workshop engine should be replaced on grounds of economy by an electro-motor drive.

The settling tanks are not cleaned frequently enough and there is a tendency for the thickness of the sand on the slow filters to fall to a dangerous extent.

No increase has been made in the number of meters maintained, though a scheme of metering was strongly recommended, the first instalment of which would cost Rs. 10,000.

The long standing dispute between the municipal board and the cantonment authorities regarding the supply of water at the latter's reservoirs was concluded after much discussion and a draft agreement was approved which involved a boosting set for the cantonment supply involving a loan of Rs. 20,000.

Spare parts for the waste detecting meters have been ordered by the board and it is hoped that the huge consumption indicated in the low zone will enlighten the municipal commissioners as to the extent of the waste taking place there. Many complaints have been received this year concerning lack of pressure in the high districts of Agra and the advice of this Department has been sought on certain proposals for remedying this defect. Generally these proposals have been to lay new pipe lines in the localities affected, but unless the waste throughout the town is restricted, such proposals can at the best only transfer the trouble from one locality to another.

The distribution maps are not properly maintained and it will be impossible to make any general recommendations until these have been brought up to date. There is no doubt, however, that the general pressure could be improved if the supply in the low districts was properly controlled, and this can only be done by metering all private connections of one half inch size and upwards in the low zone and by gradually extending the metering operations until the shortage is overcome.

In some of the hotels in Agra and in the Reserve Police Lines, tube wells have been sunk in an endeavour to obtain an independent water-supply, but they have not been wholly successful as only brackish water was met with.

In the case of the Reserve Police Lines, proposals were framed by the 1st division for the improvement of water-supply, but in the absence of guarantees that the pressure of the municipal supply would not still further deteriorate, the proposals could not be recommended with confidence.

In an endeavour to remedy the state of affairs the Inspector-General of Police employed Messrs. Scott and Saxby, Limited, to sink a tube-well in the Lines, the agreement being that the firm would charge Rs. 1,500 for the experiment in any case and that if it was successful a further Rs. 5,250 would be paid for the completion of the well. This experiment has failed because only brackish water was found.

It will be realized from the above examples how consumers are put to great inconvenience and expense on account of the unfair distribution and waste of water in Agra.

Inferior quality galvanized iron piping material is extensively used in this municipality for private connections, which rusts and leaks after the lapse of a few months. This is undoubtedly the cause of much loss of water.

Mechanical Adviser's advice has at last been accepted in the matter of sand washing plant and the sand washer purchased some years ago is now being intelligently used, with the result that 30,000 cubic feet of old sand has been rewashed and brought into use again on the slow sand filters, resulting in great savings.

In spite of the fact that Rajamandi, Gokulpura, Shahganj, Civil Lines, Allumganj and Hari Parbat areas are suffering severely, new connections are granted freely and recklessly.

The staff exhibit some discontent owing to the 12, 10 and 6¼ per cent. cuts made and because overtime allowance have been stopped.

On May 31 the dry weather stream of the Jumna completely ceased and recourse had to be taken to the Kithom reservoir and later even to escaping a supply from Okhla weir. Such crisis should be anticipated in future years in even greater severity.

Extensions to the raw Water Pumping Plant and new Paterson Filtration Plant.—This work was completed and handed over to the municipal board in November, 1930. The accounts of the work, however, have not been closed as there is still a small amount outstanding with the machinery contractors.

The vertical spindle electro-motor pumps have worked very satisfactorily since they were installed.

During a recent inspection it was noticed that the integrator and clock work mechanism of the Paterson Fluxograph were not working, and the municipal board have been advised to carry out the repairs as soon as possible. Continuous records of the water pumped are very valuable and the recorder should not be allowed to stand idle.

The new Paterson filtration plant was completed and handed over to the municipal board on June 10, 1931, and it works very satisfactorily. This new plant has augmented the filtered water supply of Agra by one million gallons daily.

The new mechanical filters should have been handed over to the municipal board long before June, 1931, but although the whole work was ready the plant could not be put into commission and tested because way-leaves had not been arranged by the board for a short length of the wash-water drain from the filtration plant which had to be carried through private property. Though the board were asked to arrange this as early as January, 1929, permission to complete the wash-water drain was not received until the end of October, 1930. This question has not been settled even now and the owner of the land has filed a civil suit claiming compensation.

The delay also caused audit objections, much inconvenience and extra expense because the contractors will have to be compensated for loss of interest on outstandings, under the terms of their contract at bank rate for payments withheld in consequence of this delay.

Water Supply Improvements—Cantonment Water Supply Boosting Pumps Rs. 23,000.—The Agra municipal board supply water in bulk to the cantonment authorities the water being delivered into two reservoirs one at the Fort and the other at Rakabgunj.

The agreement under which water is supplied has recently been revised and in order to improve their distribution, the cantonment authorities propose to raise the level of the two reservoirs.

To afford the requisite supply, two new boosting pumps will be necessary and a forecast of cost has been furnished, so that the board may arrange for funds.

Drainage.—Nothing has yet been done to deal with the drainage of Agra and the position is the same as reported last year.

AGRA— *(concld.).*

Since the preparation of a comprehensive drainage scheme for Agra, several alternatives for the first instalment, have been examined in an endeavour to find some method financially feasible.

The most obvious and the most satisfactory one is to establish a pumping station near the Bombay, Baroda and Central India Railway bridge on Strand Road and to pump all the sewage to a sewage farm on the left bank of the Jumna, the rising main to be carried on the railway bridge.

The railway authorities have definitely refused to allow the rising main to be carried on the bridge, and the only alternative is to carry the main in the bed of the river and anchor it to masonry or concrete wells, which would be a much more costly course.

The foul water drains of Agra discharge into the river at various places along the river front, resulting in most insanitary conditions which are a constant nuisance and demand immediate attention. Not only is this a menace to health but it causes a very adverse impression on numerous foreign visitors.

The Agra municipal board are desirous of improving this state of affairs and the suggestion now, is to lay the sewer along Strand Road and carry out the necessary surface work, all of which would be part of the main drainage scheme. In order to get over the difficulty of disposing of the sewage it was suggested that a temporary pumping station be established on the river bank, and the sewage pumped to the existing sewage farm in the river bed in front of the Fort. The cost would not be less than Rs. 2,00,000 and at the moment it is doubtful whether the municipal board could finance it.

Dayal Bagh drainage.—The forecast of cost was prepared at the request of the authorities of Dayal Bagh which is a colony in the vicinity of Agra belonging to a worthy religious society known as the Radha Swami Institute.

The society has built many good residential quarters as well as other buildings for educational purposes. In order to improve the sanitation of the colony the authorities now desire a drainage scheme on modern lines. The forecast of cost amounts to Rs. 1,55,400.

ALIGARH.

Water-works maintenance.—This water-supply has been working under the administration of the municipal board since November 10, 1930, when it was handed over by this department upon completion.

The contractor's maintenance period expired on November 10, 1931, and with a view to ascertain whether any defects had arisen during the maintenance the whole work was inspected carefully between October 24, 1931 and October 27, 1931.

Except for one or two minor leaks no defects worth mentioning were discovered and the contractor's security deposit was returned.

Last year's report drew attention to the low yield of the tube-wells on account of the fall in level of the sub-soil water and to remedy this defect the pump suctions have had to be lengthened so that a reasonable depression head might be maintained.

During the year the suctions on pumps nos. 2, 3 and 4 were lengthened and this has resulted in the yield being improved to about 120, 98 and 160 gallons per minute respectively.

The suction to well no. 1 was not lengthened because on test it yielded too much sand, this besides being dangerous to the structure it was thought would also injure pumping plant.

The Water-works Superintendent, however, on the authority of the municipal board lengthened the suction of this pump too and by careful work he has been able to empty the well and examine it.

He found that the concrete plug of the well around the tube had cracked and that the sand found its way into the well through these cracks. He succeeded in sealing the cracks and by this means a yield of about 150 gallons per minute from well no. 1 has been obtained which forms a valuable addition to the water-supply.

It will be necessary to observe this well carefully to prevent a subsidence due to sand blow.

Pump no. 2, owing to excessive vibration, had to be overhauled by the contractors and it is now reported to be running satisfactorily. It was found that the vibration was caused by slackness in the lignum vitae rising main bearings, which was traceable to excessive wear due to sand held in suspension in the water. The contractors claimed that this defect could not reasonably be considered a liability under the maintenance clause of their contract, and the bill for their extra expenses has been allowed.

Owing to the small yield of the tube-wells the municipal board were advised that only a standpost supply should be given to the town until more wells had been constructed. The municipal board, however, have allowed about four hundred

private connections though none are larger than 3/8". The supply to the Civil Lines is entirely cut off, presumably so that there may be more water available for the town proper. ALIGARH—(concld.).

The original sanctioned estimate for Aligarh water-supply was based on 20 gallons per head for a population of 70,000 which means a daily requirement of 1,400,000 gallons.

The existing four tube-wells are unable to fulfil these requirements and after due consideration of an alternative source from the canal a project has been prepared for more tube-wells which proves to be the cheapest means of augmenting the supply.

The estimate has been divided into two instalments, viz., 1st instalment estimated to cost Rs. 1·00 lakh and 2nd instalment estimated to cost Rs. 0·53 lakh. The board should put this work in hand in time to anticipate any possible shortage.

The board in spite of advice refuse to levy a water rate.

Drainage.—No work has been carried out in connection with the drainage of the town during the year.

ALLAHABAD.

Water-supply maintenance.—The automatic flow recorder at the gauging weir has not been corrected. This recorder shows 8 per cent. more water than actually passes over the weir and affects the accuracy of returns.

At Khusrubagh the pumping plant has been maintained in fairly good running order. Undue wear at the eyes of impeller vanes has been noticed. Spare impellers for pumps nos. 1 and 3 should, therefore, be obtained. The impellers of the pumps at the filtered station have become pitted, while at the unfiltered station where the water is gritty, little pitting has taken place. This would seem to be explained by the relative impeller speeds, for that of the filtered water pumps is 1,450 r. p.m. the accepted limit of speed, against the 960 revolutions per minute of the riverside pumps.

The scheme for metering has not progressed and the application for a loan of Rs. 50,000 has not yet been received from the board.

There is a marked shortage in certain areas due to lack of control of the distribution and the board seem powerless to tackle this in the only proper way, namely strict control of the distribution and waste prevention.

Water supply improvements. Two tube-wells for Civil Lines (Rs. 0·41 lakh).—This project consists of two tube wells and forms part of the re-organization work. For this work Rs. 12,000 were given by the Board of Public Health in March, 1930 and Government sanctioned a loan of Rs. 30,153 in November, 1930 but the municipal board have so far not deposited the necessary funds or acquired the site. The Chairman recently proposed to utilize a portion of the funds for renovating the Mayo Hall tube well and to use the balance for the acquisition of a site for the tube-wells. But this has not been approved by Government. The municipal board still delays to put the work originally sanctioned in hand, even though full funds were provided by Government as long as 1930.

Magh mela. Maintenance of the pumping plant and water-supply (Rs. 0·012 lakh).—The oil engine driven air-lift-cum-centrifugal pumping plant has been in charge of the Well-boring Operations Division and was overhauled last in December, 1930. The necessary spare parts have also been purchased.

The water-supply during the mela was satisfactorily maintained from January 6, 1932 to March 7, 1932.

Magh mela water-supply and maintenance, 1931-32 (Sanctioned estimate Rs. 0·14 lakh).—The contract for water-supply distribution arrangements has been placed with the firm of Messrs Noorullah Ghazanfarullah of Allahabad for a period of twelve years. The entire stock for the mela was maintained departmentally until November, 1931, when it was handed over to the contractors according to the terms of the new contract. The water supply distribution works were completed well in time and maintained satisfactorily during the mela period by this firm.

Magh mela water-supply, second tube-well (Rs. 0·007 lakh).—A forecast of cost for a motor driven air compressor and centrifugal pump for the second tube well together with a surge tank has been prepared to render the water-supply more reliable during Kumbh and Adh Kumbh fairs. There is doubt about funds being available in the near future for this work.

Magh mela electrification, 1931-32 (Estimated cost Rs. 0·11 lakh).—The electrification of the mela area was completed in time and maintained satisfactorily during the whole mela period. Owing to financial stringency, electric light for the official camps was not possible. The revenue from this source was, therefore, much less than was anticipated and a reduced income was also derived from private consumers.

ALLAHABAD - (*concld.*).

Tube-well in Alfred Park (*Rs.* 0·14 *lakh*).—This is intended to replace the existing inadequate supply from the riverside pumping station. Specifications and contract documents were prepared in 1930-31 but the work could not be started as funds could not be found.

Drainage pumping plant.—The venturi meter recording the discharge of sewage was found on testing to indicate 13 per cent. high which results in impossible figures of efficiency being returned for the plant.

The old Aster generating sets require a good deal of overhauling and upkeep.

It was recommended that power for working the small motor and for lighting the station should be obtained from the supply company. Terms were obtained but as the cost was high the question was held in abeyance. Recently reduced terms were offered by the supply company which will result in a small annual saving, and will enable heavy charges for overhauling the petrol engines and appurtenances to be avoided. This change should now take place in the interests of economy.

Some of the spare parts recommended have been obtained and the pumping sets have been overhauled but additional spares as recommended by the Mechanical Adviser still remain to be obtained.

Drainage pumping station. Repairs to rising main pipes (*Rs.* 0·01 *lakh*).—A forecast for reconditioning old pipes was prepared at the request of the Municipal Engineer, Allahabad, and presented to the municipal board, the fair estimate will be taken in hand when the municipal board accept the forecast and deposit the necessary fees.

Sewage disposal.—About 240 acres of municipal farm land were treated and a revenue of Rs. 9,000 about obtained in addition the sale of surplus sewage to the Agricultural Institute brought in a return of Rs. 4,000.

Drainage of an insanitary nala behind the district jail, Allahabad (*Estimated cost Rs.* 0·11 *lakh*).—The works have been completed and accounts closed. The works, situate on the Jail premises, have been taken over by the Jail authorities and the municipal board, Allahabad, have taken over the remaining works.

ALMORA.

Water-supply improvements. Water-supply (*Estimated cost Rs.* 1·75 *lakhs*).—The works were completed early in April, 1931, and the supply of water to the town commenced from the middle of April, 1931, but during the month of June and consequent on unusual drought in the Kumaun hills, the supply from the springs in the Siahi Devi hills diminished considerably and shortage of water formed the subject of much adverse criticism from the Almora public and the municipal board became doubtful of the value of the new works. The drought was not peculiar to the town of Almora alone, but was spread over a considerable area in the Kumaun hills. The shortage lasted only till the beginning of the rains in June, since which date the water-supply has been copious and the pipe lines and other works have given every satisfaction.

The municipal board nevertheless refused to take over the works unless they were certified by the Executive Engineer as being satisfactory in every way. The contractors, therefore, in addition to maintaining the new works as defined in the contract, supervised and ran the water-supply of the town till the end of February, 1932, when they declined to maintain the water supply any further, claiming that such further maintenance was outside the scope of the contract. The municipal board was thereupon requested to deposit a further sum of Rs. 500 for maintaining the supply departmentally till the end of April, 1932, as it was not possible for the Executive Engineer to visit Almora owing to pressure of work at the close of the financial year. The amount was deposited by the municipal board after prolonged correspondence and the work was maintained departmentally, until the inspection took place and the contractor's security deposit was also retained, pending this inspection.

BAHRAICH.

Water-supply (*Rs.* 3·75 *lakhs*).—A joint scheme for water-supply to the town of Bahraich and the Durgah Syed Salar was prepared, but it had to be indefinitely postponed, owing to want of funds and the failure of the local authorities to come to an agreement regarding joint management. The municipal board even were unable to pay the fees for preparing the scheme and so the Board of Public Health had to come to their aid in providing funds for this purpose.

BAREILLY.

Anti-malarial drainage (*Estimated cost Rs.* 0·18 *lakh*).—Tenders for this work were invited in February, 1931, but the contract was not placed as the contribution from the railway authorities was not received till September, 1931. Tenders had to be called a second time as the period of acceptance had expired. The construction work is well in hand.

BENARES.

Water-supply maintenance.—The new pumping stations and plant completed in 1929-30 at Bholupura (filtered) and Bhadaini (unfiltered) stations were maintained in excellent condition. Very few minor new parts had to be fitted.

BENARES —(*concld.*).

The work on the slow sand filters, gauge tanks and weir carried out by the municipal board have proved to be very unsatisfactory. The inlet chamber and gauging weir constructed in 1929 gave trouble through settlement and cracking, so that in spite of extensive repairs it was proposed to substitute an iron tank in its place.

Slow sand filter no. 10 has not so far been completed although this work was started in 1929.

The demand for water has continued to increase, and in the last five years has risen from 2,423 million gallons to 2,789 million gallons per annum; the consumption per head per day is now 37·11 gallons. If trade connections are not taken into account the consumption is the second greatest in the Province, Allahabad being the highest.

There are 1,160 connections of ½″ size and over, out of which only 177 are metered, and the board fails to make an adequate provision for purchase of meters year after year. The revenue derived by assessment is only 1·98 annas per 1,000 gallons as against 6·4 to 8·9 annas from the metered consumers.

The board had consistently ignored the orders of Government as regards their water works accounts, they credit the meter revenues only with the excess consumption measured and not the whole quantity supplied through the meters.

At Bhelupura, although very little repair work has been necessary to the pumping plant, the workshops have been fully occupied, and have yielded a continuous income to the board of about Rs. 8,000 to Rs. 10,000 per annum.

At Bhadaini, the river bank has been cleared of the debris lying about the slopes graded and paved with brickwork, thereby preventing silt from the bank affecting the suctions.

The old steam plant at both filtered and unfiltered stations is maintained in case of emergency. The redeeming feature of Benares water supply is the work of the Water Works Superintendent, Mr. Dastoor, who in spite of almost insuperable difficulties has managed to keep his stations and plant in first class order.

Water-supply extension (*Total estimated cost Rs.* 5,12,255 *plus Rs.* 18,000= 5·30 *lakhs*).—The works were handed over to the municipal board in 1930 and have since been maintained in good running order. The pumping plant has worked very satisfactorily. The Chairman on behalf of the board has officially acknowledged the value of this work. The accounts of the work have not been closed as some of the spare parts have yet to be received from the contractors.

Benares drainage.—Although a forecast of cost for a comprehensive scheme for drainage was presented to the municipal board in June, 1928, so far no decision has been come to on these proposals.

A comprehensive scheme would cost about Rs. 25 lakhs, but a first instalment is possible for a sum of Rs. 2·87 lakhs, by means of which the nuisance and pollution of the ghats could be done away with.

So far the board have only been able to proffer sufficient funds to cover the cost of preparing the detailed project for the first instalment. As it is doubtful in such circumstances whether the board will be able to proceed with the scheme within a reasonable time, the undertaking of this project has been postponed.

BHIMTAL (NAINI TAL).

Water-supply, second instalment (*Estimated cost Rs.* 0·17 *lakh*).—This part of the project included the re-organization of the distribution system. Work was started in January, 1931, and completed in April of the same year after which final payment was made. The completed works were maintained during the remainder of the year by the contractor.

BRINDABAN.

Water-supply improvement.—Three previous trial bores having failed to locate potable water a fresh site was selected as a last resort. Here fairly satisfactory water bearing strata were luckily found below a depth of 218 feet. A 4″ tube of the new strainerless type was inserted and the well was completed. The water was found to satisfy all tests as regards salinity and purity and the results of test pumping showed that the well could be depended upon to yield 50 gallons per minute with 20 feet depression. Thus five more 4″ tube-wells will be required for the supply to Brindaban.

As the financial condition of the board does not justify a loan and since the question of an enhanced pilgrim tax is likely to take time, further construction of wells has been postponed.

Drainage.—Nothing has been effected in connection with the drainage project this year, which is held in abeyance pending the arrangement of funds.

Infectious diseases hospital (*Rs.* 0·45 *lakh*).—Tenders were called for for this work on November 5, 1931, and the contract has been let. Materials have been collected and the work has been started.

BUDAUN.

Drainage (Estimated cost Rs. 0·89 lakh).—The works were completed and finally passed by the Executive Engineer by the beginning of July and the final bill was paid. The contractor's maintenance period also expired in March this year. Complaints about this work have been received from the municipal board and the matter is being investigated.

A revised estimate was prepared as many additions and alterations were made during the progress of the work.

Drainage extension (Estimated cost Rs. 0·46 lakh).—This estimate was prepared at the request of the municipal board for the construction of more surface drains in certain mohallas which had not been provided with drains under the original scheme.

CAWNPORE.

Water-supply maintenance.—The plant at Bhaironghat, the riverside pumping station and at Benajhabar, the filtered pumping station, and the canal supply plant, recently completed under the re-organization carried out through Messrs. Lane Brown and Hewlett, Consulting Engineers, worked satisfactorily. The old steam plant is still maintained as a standby.

It is worthy of note that the tube-well constructed about 1912-13 is still in constant use and that it yields over 400 gallons per minute continuously. Judging from the records, the increase in the supply from this well is consequent to a fracture of the stainer; in such case the tube must act as a cavity well in a remarkably successful manner.

Because a far greater percentage of private connections than in any other municipality in United Provinces is metered, this board succeeds in maintaining a good margin of profit and is well able to undertake improvements and extensions from its own resources, without assistance. The advice of inspecting officers is promptly taken advantage of. Each year a suitable sum is provided for the upkeep and repairs of water meters and for additional meters to replace those worn out. This board has every reason to be proud of its record when compared with others in this Province.

On behalf of the Improvement Trust a project for a tube-well near the Kalpi Road amounting to Rs. 0·14 lakh was prepared.

A forecast of cost for a tube-well in Wheeler's Entrenchment (Cantonments) with an air lift pumping plant for supplying 40,000 gallons per day for irrigation purposes amounting to Rs. 0·32 lakh was supplied to the Superintendent, Archaeological Survey.

Drainage, Part VI (Rs. 2·25 lakhs).—Preliminary proposals for this work were prepared at the request of the municipal board, Cawnpore, and have been approved. The fees for preparation of the fair project have also been deposited recently by the board and the fair project will be taken up as soon as staff is available.

Sewage disposal (Rs. 6·00 lakhs).—This project was prepared at the request of the municipal board, to prevent pollution of the Ganges and also with a view to earning revenue. It is proposed to intercept all sewage, now being discharged into the river, near Jajmau and to treat it on land.

The project is now nearing completion.

Parmat pumping station re-organization.—The existing Parmat Ghat Sewage Pumping Station cannot deal with the sewage flow which is continually increasing and at the request of the municipal board, preliminary proposals for necessary extensions have been furnished which amount to Rs. 2·08 lakhs.

Efforts are being made to complete a project for the drainage of the Industrial School, Cawnpore, which work will cost about Rs. 20,000 and also to complete a type design for a tanyard and godowns.

CHIRGAON (JHANSI).

Drainage extension (Estimated cost Rs. 0·34 lakh).—This work was satisfactorily completed with a saving of Rs. 6,000. At the request of the District Magistrate, Jhansi, this saving is being utilized in the construction of additional drainage work.

DEHRA DUN.

Water-supply maintenance.—The supplies from the three springs, viz., Kolukhet, Baldi and Nala Pani, have been well maintained. During the rains and cold season no shortage of water was experienced, but during the hot months of May, June and July there is great demand, and as the yield of the springs falls off in this season the supply is not sufficient. The daily average supply is only about 8 gallons per head which is quite insufficient for Dehra Dun.

Water-supply improvements.—The contractors who supplied the chlorinating and water softening plant could not fulfil the guarantees under their contract as regards the amount of chemicals required to soften the water and the maintenance charges proved considerably more than anticipated.

The board were not prepared to face the additional running expenditure and the contractors agreed to abide by the stipulations of the contract without demur and removed the softening plant and the cost thereof was debited to their account.

In addition to this the firm agreed to pay Rs. 10,605 towards the cost of the softening plant buildings and proportional departmental fees incurred on the supervision of the softening plant.

The contractors did not hesitate to make good the losses once it was established that under the terms of the contract their guarantees were not fulfilled.

The contractors also carried out certain alterations to the Kolukhet and Baldi chlorinating plants free of cost, with the object of making them automatic under all variations of flow. This work was not originally provided in the contract.

On account of the absence of softening plant certain alterations had to be carried out to the settling tank, so that it could be used as a reaction and storage tank in connection with the chlorination gear.

Since the erection of the Kolukhet dosing station a defect in the pipe line immediately below the site became apparent. The existing 3″ pipe line does not deliver sufficient water and it is proposed to substitute a new 4″ main in the length affected.

A supplementary estimate for this work has been sanctioned by Government, and permission has been given to utilize the savings on this replacement.

Banjarawala springs water-supply, forecast of cost (*Rs.* 3·23 *lakhs*).—As previously mentioned Dehra Dun suffers water shortage each hot weather. Also the supply from the Baldi springs is so hard that for domestic purposes its use is most unpopular and attempts to augment the supply from this source would, therefore, be inadvisable. Furthermore the cost of softening large quantities is prohibitive, and recourse should be had to some source of softer water.

Many searches to discover good springs giving a sufficient supply of soft water have been made, but none have so far been discovered at a sufficient elevation to allow the water to gravitate to Dehra Dun.

Good springs have been discovered at Banjarawala, about four miles from Dehra Dun towards the south, the water from which is reasonably soft. These springs unfortunately are much lower than Dehra Dun and pumping will be necessary.

A forecast of cost has been prepared on behalf of the municipality for a scheme to pump water from these springs to Dehra Dun.

Preliminary investigations to test the extent and potability of the springs before the project is finally approved, are estimated to cost Rs. 0·12 lakh.

In Dehra Dun there is no water-tax at present, and in order to meet the recurring charges of the Banjarawala supply the board will find it necessary to introduce a water-tax.

On this account the scheme has not been received very enthusiastically by the members of the municipal board and a small committee has been appointed to endeavour to discover another source of supply which would not necessitate expensive pumping.

This progressive municipality is much handicapped in its efforts for improvements by lack of funds.

Drainage maintenance.—The existing sewers and drains work satisfactorily, but a portion only of the town is served.

The western portion of Dehra Dun is in a very unsatisfactory state as regards drainage and many improvements are desirable.

Preliminary proposals were prepared in 1929 for the drainage of this area, but the fair project has not been prepared.

The municipal board desire a fair project for the drainage of mohalla Laki Bagh, which was included in the above mentioned preliminary proposals. This mohalla is immediately south of Arhat Bazar and like other mohallas of the western portion of Dehra Dun the present drainage is very unsatisfactory.

Dehra Dun offers favourable scope for a water flushed system of sewers, which would be of great benefit. The cost of such a work is, however, likely to deter the board from embarking upon the project.

Sewage disposal.—The Dehra Dun sewage farm deals only with a portion of the sewage discharged; a large amount is still flowing to waste.

Land has been acquired on the other side of the *nala* for an extension of the sewage farm, but possession of this land has not yet been taken by the board.

Rupees 500 per annum is derived in rent from cultivators of the sewage farm, five acres in extent. The tenants this year demanded a remission of 7 annas in the rupee in consequence of the general remission of revenue conceded by Government to other cultivators. A remission in the case of a sewage farm is not justifiable. High prices are obtainable for the produce and the rent of the farm also includes irrigation and manure.

DEHRA DUN—(*concld.*)

The actual rent of land without these benefits would not be anything like Rs. 100 per acre, and if any remission is granted, it should be based on the rental of unirrigated land.

Infectious diseases hospital (*Rs.* 0·47 *lakh*).—This work has been completed and was handed over to the municipal board on December 20, 1931.

DEWA.

Fair water-supply construction of a tube-well (*Rs.* 0·58 *lakh*).—This scheme consists of a tube-well supply intended to provide water for people attending the annual fair at Dewa. An allotment of Rs. 16,560 was received by the end of July, 1931, for the tube-well and for an office and store. The contract was let in November, 1931.

15″ casing pipes have been sunk to 235 feet below ground level. Very favourable strata have been found. It is expected that the tube-well will be complete before the rains of 1932. The remaining portion of the work, i.e., the distribution system and the pumping plant will be taken in hand as soon as the well has been tested.

ETAWAH.

Construction of a 5 feet diameter masonry well in the kutchery compound (*Rs.* 0·14 *lakh*).—This is an incomplete work of the last year, the well together with the hand pump has been completed and handed over to the District Magistrate, Etawah.

FATEHGARH.

A tube-well for the new police lines (*Rs.* 0·022 *lakh*).—This estimate was prepared to do away with the trouble of sand blowing in the well constructed in the new police lines at Fatehgarh, at the request of the Deputy Chief Engineer, III Circle.

FATEHPUR SIKRI.

Water-supply maintenance.—The tube-well which was constructed in 1925, and tested to give a yield of 85/86 g. p. m., functioned satisfactorily, and the discharge was more than maintained. A few more standposts have been added during this year to meet the demands during melas.

The plant and equipment was satisfactorily maintained throughout the year. The assessment of property has been completed but as this is the first year of its operation, the income amounts to Rs. 1,913 while the expenditure on maintenance comes to Rs. 3,151.

Government is being approached to sanction an octroi duty so that the deficiency may be made good.

Some metered private connections are also to be allowed which ought to increase the revenue.

The whole of the water-supply depends on one tube-well and one set of pumping plant. As soon as its financial condition enables the Notified Area Committee to proceed, duplicate arrangements are highly advisable.

At the instance of the Secretary of the Islamia Committee arrangements for supplying water to the pilgrims who stay at the Durgah during the mela called "Urs", were made at an estimated cost of Rs. 0·15 lakh. These provide a balancing tank of 10,000 gallons capacity and four service tanks having a capacity of 800 gallons each, located in convenient positions around the Durgah.

The construction of the mela water-supply was started in the beginning of August, 1931, and completed satisfactorily by the middle of March, 1932.

During the progress of the work the Islamia Committee requested the Board of Public Health to sanction the construction of a standpost inside the Durgah. Sanction was accorded and the work has also been completed the cost being met from saving in the estimate.

Water-supply improvements (*Rs.* 0·04 *lakh*).—The Fatehpur Sikri Notified Area Committee desire more standposts in the town, and to meet this demand a forecast of cost has been prepared which provides for seven additional standposts, but in order to conserve the supply as much as possible the existing four tap standposts will be converted to two tap standposts. The Board of Public Health have approved of the forecast of cost and a grant of Rs. 4,000 has been given for the work.

A fair project will now be submitted for sanction and the work will be put in hand as soon as possible.

Drainage.—Some roadside drains exist in places in Fatehpur Sikri town, but with a water-supply established, drainage improvements are becoming more urgent.

FYZABAD.

Water-supply maintenance.—The pumping plant has been maintained in very good running order. The 5th tube-well has been working since October 9, 1931, and has resulted in adding 300 gallons per minute to the town water supply, which is about 66 per cent. of the former supply. After a lapse of six years a continuous supply of water has again been given to the town.

A great deal of the shortage hitherto suffered at Fyzabad is due to uncontrolled waste. If rigorous steps are not taken at once the addition now made, will soon be

absorbed and a shortage will again become evident. Recommendations to abandon well no. 3, which at present only yields 50 gallons per minute, and to construct another tube-well close to it, and to connect the existing suction, have been made to the board. The board have requested to be furnished with preliminary proposals for this work. FYZABAD—(*concld.*).

The new rider main has been of great service in reducing waste, for until its completion those connections to the rising main enjoyed much greater periods of supply and higher pressures and could not be controlled.

The extensive use of inferior galvanised iron piping has been observed in this town for private connections.

Under the advice of the Mechanical Adviser the judicious drilling of holes in the impeller of pump, no. 1 set, resulted in the removal of all end thrust trouble.

The total pumping hours during the year under review were 7,496 against 6,535 of 1930-31, i.e., about 14 per cent. more than the previous year, while the total quantity of water pumped was 183·3 million gallons against 161·10 million gallons of 1930-31, i.e., about 12 per cent. more water was pumped. This improvement has been rendered possible by the addition of no. 5 well.

The cost of maintenance including interest and sinking fund amounts to Rs. 43,272 while the income is Rs. 44,709 leaving only a balance of Rs. 1,437 as profit. This small margin is reported to be due to heavy remissions on grounds of poverty amounting to Rs. 3,134 as well as arrears of water tax amounting to Rs. 2,871.

Water-supply extension.—The works in connection with the fifth tube-well were estimated to cost Rs. 50,096. The pumping plant when completed was tested by the Mechanical Adviser and proved extremely satisfactory. The municipal board have passed a resolution recording their appreciation of the work done.

Additional work in removing and repairing of the existing Venturi meters has been sanctioned, which is estimated to cost Rs. 5,173.

Water-supply—Construction of two tube-wells (*Rs.* 0·37 *lakh*).—These tube wells are required for a water-supply to Ajodhya, an important pilgrim centre, and form part of a sanctioned project. One well of the new type with gravel feed chamber was completed last year and handed over to the Fyzabad municipal board. Allotment for the second well was received by the end of last year and the board have arranged for the acquisition of the site, but have requested that the cost of acquisition be paid from the allotment and promise to return this sum in 1932-33. Their proposal has been accepted by the Board of Public Health and the work on the second tube-well will shortly be started. AJODHYA.

Elevated tank capacity 12,000 *gallons.*—The plan and estimate for an elevated tank to hold about 12,000 gallons was prepared at the request of the Chairman, Municipal Board, Ghaziabad. GHAZIABAD.

The board required advice concerning the design of the tank only. The pumping arrangements, distribution and general suitability of the scheme were not investigated.

Water-supply—A trial tube-well (*Rs.* 0·20 *lakh*).—This estimate was prepared at the request of the Chairman, Municipal Board, Ghazipur, for a trial tube-well in connection with the town water-supply. It was submitted to the Board of Public Health by the municipal board through the Commissioner, Benares division, for sanction and for a grant or loan to carry out the work. But the Board of Public Health rejected the project on account of paucity of funds. GHAZIPUR.

Water-supply maintenance.—The plant has been maintained in working order but on account of wear on the bevel of the gearing of one of the pumps, only one set can be worked. GOLA GOKARAN NATH.

The manufacturers have been referred to, for spare wheels and other parts, and some spare parts even have already been obtained.

A supplementary supply of canal water for filling the bathing tank being now available, the piped supply of water is used for domestic purposes only.

The discharge of the tube-well has fallen, and recommendations for cleaning by compressed air, which will cost about Rs. 1,200 have been made to the district board. Lack of funds prevents this work being taken up, but it is inevitable sooner or later if the supply is to be maintained. The Board of Public Health have refused assistance until the district board see their way to meet a substantial share of the cost.

Drainage (*Rs.* 3·44 *lakhs*).—The detailed scheme for improving the drainage of the town exists, but it has not yet been approved by the board who have been advised to take up the construction of the main sewer as a first instalment. GORAKHPUR.

The board seem to be in earnest now about their drainage proposals and have requested Government to provide loan funds at an early date.

The water-supply proposal have been dropped for want of funds.

HALDWANI.

Water-supply improvement (Estimated cost Rs. 0·06 lakh).—The works consisted of the replacement of the old 4″ C. I. main near the head works by a new 6″ main. The work started about January, 1931, and completed by the middle of March last.

Purification plant (Rs 0·17 lakh).—As there have been some complaints regarding the quality of the supply, proposals are in hand for the substitution of purification plant to replace obsolete work.

BANBHULPURA.

Drainage works (Estimated cost Rs. 0·42 lakh).—Funds for this work, having been arranged, tenders were called for and the contract placed with the lowest tenderer. Construction is in hand.

HARDWAR.

Water-supply maintenance.—These works were maintained in good order and the pumping plant functioned satisfactorily. No. 3 well, which was found to be contaminated, has been again brought into use after cleaning and testing.

The demand at Hardwar shows signs of outstripping the capacity of the wells and the time when an additional well is required is not far distant.

The revenue including Government grant of Rs. 30,000 amounts to Rs. 52,410 whilst the annual cost totalled Rs. 32,812.

The board realize that expenditure can be considerably cut down by reducing waste and to this end they have reduced the size of the ferrule connections to all standposts with good results.

Electric supply maintenance.—This supply which is obtained from the Bahadurabad hydro-electric power station of the Irrigation branch was satisfactorily maintained and no complaints have been recorded. The revenue amounted to Rs. 73,368 whilst the annual cost totalled Rs. 68,675.

Drainage.—No developments have taken place towards pursuing the construction of Hardwar drainage. The Hardwar Advisory Committee which sat at Hardwar on August 27, 1931, recorded that they considered drainage to be the most important sanitary measure for Hardwar.

It should be mentioned that Government in 1930 offered a substantial grant to enable the main sewer to be laid, but the Hindu Sabha were not enthusiastic over the proposals and laid down such stipulations that Government decided not to entertain the proposals any further.

Har-ki-Pairi (Improvements Rs. 1·96 lakhs).—Preliminary proposals for the improvement of Har-ki-Pairi at Hardwar were prepared and approved by the Board of Public Health in 1930. A fair project for the first instalment of this scheme has been submitted and sanctioned by the Board of Public Health.

The board should arrange for funds immediately if it desired that the improvements should be effected in time for the next Adh Kumbh Mela.

Additions to the infectious diseases hospital (Rs. 0·25 lakh).—The board requested the assistance of this Department to prepare a project which was afforded them.

Town planning of Bhopatwala (Rs. 9·00 lakhs).—As reported last year a forecast of cost for this scheme was presented to the board. The scheme also contained proposals for training Sookh Ran and Bagh Rao.

The Hardwar Advisory Committee which met at Hardwar on August 27, 1931, resolved that the proposal should stand over for want of funds. The fair project has therefore not been proceeded with.

Training Lalta Rao (Rs. 1·19 lakhs).—Preliminary proposals for this work were presented to the board as reported last year, but a fair project has not been prepared because the Hardwar Advisory Committee stated that "In view of shortage of funds the scheme should stand over for the present."

A building estate plan showing roads, buildings and proposed drains was prepared together with a report for the information of the board, so that the building sites on nazul land around the Jana Akhara could be auctioned.

HATHRAS.

Water-supply (Rs. 0·35 lakh).—Wells nos. 3 and 4 have been completed. A new site was selected for no. 5 well which has also been completed. These wells together with nos. 1 and 2, completed previously, will supply 500 gallons per minute for the town.

Funds are being arranged by the municipal board as soon as these are made available, tenders will be called for machinery, building work and pipe laying.

JAUNPUR.

Water supply (Rs. 1·29 lakhs).—The trial bores having failed to yield a potable supply and the Archaeological department having refused the use of the land inside the Fort for the installation of pumping plant and filters, other alternatives have been examined for a feasible scheme within the means of the Jaunpur municipality, which

suffers acutely for want of a potable water-supply. The result has been a nucleous scheme for a standpost supply which can be carried out by the board itself without Government help. Such a scheme, costing about Rs. 1¼ lakhs which could be extended when financial conditions permit, is now under preparation and will shortly be presented to the board. **JAUNPUR—** (*concld.*).

Water-supply maintenance.—The municipal board continued to take more interest in its water-supply undertaking. Extensions and improvement to the distribution system have been carried out. A few of the old leaking suction pipes in the Pahuj bund have been replaced. This improvement has had a marked effect on the condition and life of pump plungers and liners. Some more piping still remains to be replaced. With the construction of a new suction main from the canal and a masonry well near the engine house, better working of the plant has been ensured. There has been great difficulty during the past year about coal fuel but a contract for good coal is said to have been entered into by the board this year. **JHANSI.**

No new meters were purchased by the board, but they have declared their intention of providing sufficient funds for meters next year.

The revenue earned amounted to Rs. 17,533 against Rs. 15,953 of last year, and the maintenance charges amounted to Rs. 14,495 resulting in a profit of Rs. 3,038.

Water-supply improvements.—Babina water-supply scheme (Rs. 36·88 lakhs).—The project revised by the railway authorities has resulted in increased estimates.

Some expenditure has been incurred in making test bore-holes at the dam site to obtain geological information and later in the year the railway authorities presented a bill amounting to Rs. 4,273 as the share of the municipality, which the municipal board declined to pay on the ground that it was not consulted before the expenditure was incurred. The matter is under consideration of Government.

The cantonment authorities have made their own arrangements in the meantime, for supply of water and have withdrawn from the joint scheme.

The scheme as it now stands is costly and beyond the capacity of the municipal board to finance without liberal help from Government.

Drainage.—The preparation of a comprehensive drainage scheme for Jhansi has been finally dropped as it has been decided not to undertake any project work for which there is no prospect of finding funds in the near future.

Drainage improvement (Rs. 0·60 lakh).—The works which were left over on account of the dispute over acquisition of platforms and encroachments, consist of kerb and channel drains, hand pump and well head for flushing and the fitting of a chain pump in the sump wells at the outfalls. These have all been completed and handed over to the President, Notified Area Committee. **KAIMGANG.**

Drainage improvement Block E (Rs. 0·15 lakh).—This is a surface drainage scheme for a portion of the town for which some *chabutras* and land had to be acquired. A deposit of Rs. 12,790 has been received for this work, but a balance of Rs. 2,307 is still due from the board. This they promise to pay during 1932-33 having made the necessary budget provision. Their request to start the work immediately has been acceded to, and the work will shortly be started. **KANAUJ.**

Electric supply.—The work comprising three transformer sub-stations and 12 miles of distribution mains was completed by this Department and handed over to the municipal board in October, 1930. The final bill for the work was paid in August, 1931. The total expenditure was Rs. 52,634. **KHURJA.**

The whole installation has been run by a trading company on behalf of the municipal board, but from January 1, 1932, the District Magistrate has taken over charge. An Assistant Engineer of this Department was deputed to help the District Magistrate in taking over.

This transaction against which the board had been previously warned, proved a failure and the public have suffered some loss and inconvenience.

Water-supply maintenance.—The pumping plant received fair attention and remained in good running order. **KOSI.**

The yield of the tube-well was well maintained throughout the year.

Considering the small number of connection (36, including 23 standposts), the financial position is very satisfactory. During the year under report the total revenue earned was Rs. 8,419, while the expenditure incurred on maintenance amounted to Rs. 4,840. This indicates how a small water-works can be made to pay in the early stages of its life.

The supply to the town is, however, dependent on one tube-well and one set of pumping plant.

It would be prudent for the notified area committee to duplicate the well and plant as soon as funds permit.

KOSI—(*concld.*).

Drainage (Rs. 0·62 lakh).—As reported last year a forecast of cost for the improvement of the drainage of Kosi Kalan was prepared.

The notified area committee submitted this forecast to the Board of Public Health for sanction together with a request for a grant of Rs. 1,500 to cover the fees for the preparation of a detailed drainage project.

The Board of Public Health replied that they could not provide funds.

LUCKNOW.

Water-supply maintenance.—Silting has again caused trouble at the Gaughat intake with deleterious effect also on the pumping plant. The board so far have done nothing to give effect to the recommendations given several years ago for river training and the Gumti river now threatens to swing further than ever from the intake site.

Although the handing over of the municipal electric generating station to the United Provinces Electric Supply Company saved the town from impending disaster yet serious danger is again imminent; this time due to the neglect of the board to employ properly qualified and experienced staff. The whole supply to Lucknow depends upon two electro-motor driven centrifugal pumping sets. Both these sets owing to want of skilled adjustment and renewals are now almost ruined. The neck rings have been allowed to work loose and to cut into the fabric of the pump casing, the metal of which has become dangerously thin, being in places about one-sixteenth inch thick instead of over one inch. Set no. 1 has been patched up as far as local means permit by the favour of the Resident Engineer of the United Provinces Electric Supply Company. The municipal board, it should be noted, failed to appoint a Water-works Superintendent for over eighteen months in spite of Government orders.

During last hot weather these pumps worked sometime twenty-four hours per day. The provision of a third set would be justified to ensure the safety of the present supply, but not for an increase as most of the water now pumped is wasted.

This year the reconditioning of the slow sand filters was taken in hand, and all seven filters were reconditioned. This work caused a very great strain on the old mechanical filters, which therefore required thorough overhauling.

Messrs. Paterson Engineering Company satisfactorily completed this overhauling during the year and the mechanical filtration system worked satisfactorily during the year.

No serious attempt has been made to increase the number of meters or control the waste taking place which has become colossal. Out of 2,238 connections of half inch and above only about 511 are metered, in spite of the fact that income from metered supplies amount to 5·92 annas per 1,000 gallons against 2·72 annas per 1,000 gallons from assessment.

A provision of Rs. 8,000 only has been made for the purchase of meters, but this is quite insufficient. Larger sums should be provided each year for a number of years to bring the system under effective control. A properly thought out scheme for metering is required before any expenditure whatever is incurred and so far this even is wanting.

A sum of about Rs. 90,000 has been spent by the board in laying small lengths of piping in many mohallas and though it was stated that this work formed part of the sanctioned scheme the details could not be reconciled and so far no explanation is forthcoming.

The overhead tank at Aishbagh has not been painted for several years; no record exists as to when it was last painted. Further neglect may cause the plates to rust and the tank to fail.

The board has only recently attempted to appoint an experienced superintendent for their water-works, who will require whole-hearted assistance, if the public are to be saved from a calamity in water-supply.

In spite of Government orders this board does not credit a proper amount towards the cost of water used for municipal purposes, although about Rs. 75,000 worth of water is so utilized. Rs. 1,608 only have been credited.

Great areas suffer grevious distress owing to shortage or a total absence even of supply in the hot months of the year and this distress shows proof of progressive intensity.

The Railway colonies and cantonments are seriously considering inaugurating their own supplies from tube-wells. In spite of the new main laid a few years ago the supply to the above areas is not adjusted fairly, the bulk of the water being drawn off to the city mohallas.

The profit on year's working amounted to Rs. 1,25,980.

LUCKNOW —(*concld.*).

Sewage pumping station.—The state of affairs at this station are so far the worst recorded. The sludging gears have been out of action for about two and a half years, but no attempt is being made to put these in order. All four pumps are in a bad condition and require thorough overhauling. The sewage is permitted to collect and become "tanked" in the sewers in spite of warnings. Sometimes complaints of sewage overflow are also received.

It is to the board's credit, however, that operations for reinstating the western intercepting sewers were commenced.

Sewage farm.—In spite of warnings also this land has been let on long lease and the municipality lose heavily in the transaction and an excellent opportunity of providing cheap fodder and other produce for the city is lost. Full benefit of the sewage also is not derived, much being allowed to flow to the river unused.

Anti-malaria and drainage works. Ghazi-ud-din Hyder canal maintenance (Estimated cost Rs. 0·14 lakh).—This system has been maintained by Executive Engineer, II division, during the year. No complaints regarding mosquito breeding were received. Applications for connections to the 24″ foul water sewer are frequently received, mainly from the East Indian Railway authorities.

The maintenance cost for 1932-33 is estimated to amount to Rs. 0·08 lakh.

Assistance was given to the Consulting Architect to Government in designing drainage extension proposals for King George's Medical College Nurses Home.

MEERUT.

Water-works maintenance.—The filters and the pumping plant at Bhola have been well maintained by the Water-works Superintendent. There is still a serious water shortage in Civil Lines, especially during the hot weather.

As regards the question of metering, it was recommended that connections of one-half inch size and above should be metered, but instead of providing Rs. 10,000 for metering a sum of Rs. 200 only has been provided by the board.

The board recorded its opinion "that the metering of private connections would never prove paying, but would on the other hand lead to the unpopularity of the water-works."

A proper ferrule rating as recommended has also not been adopted by the board, and the minimum ferrules are of 3/8″ size, while other similar towns have 1/8″, 3/16″ and 1/4″ ferrules. The result of not accepting recommendation of the Mechanical Adviser given from time to time is apparent in that, though the working cost per 1,000 gallons of water pumped is the lowest in the whole of these Provinces, yet this supply has not so far been able to meet its running charges.

The pay of the staff, which was reduced by the board, has again been restored, thereby removing many complaints.

After much endeavour the board has been able to make provision of Rs. 8,000 for the cost of a new hydraulic turbine wheel.

It was suggested that a boosting pump should be installed so as to improve the pressure in Civil Lines and in order to put forward definite proposals it was necessary to take the existing pressures at certain points on the pipe lines. The board was requested to instruct the Water-works Superintendent to assist in this work, but assistance was refused on the grounds that there were no funds for the work. The work would not have cost more than Rs. 100. It would appear that there is no desire on the part of the board to assist Civil Lines though many residents there complain of shortage.

When the responsibility of the board to supply water was brought to their notice the reply received illustrates their views on their responsibility for the public supply, viz. "As to the legal responsibilities of the board I am afraid there is some misunderstanding about it. Meerut has neither water-rate, nor water-tax. There are only water charges and any customer feeling dissatisfied will be at liberty to sever the connection and he will have nothing more to pay to the municipal board."

Drainage.—A drainage scheme has been on the list of pending projects of this Department for many years but it has never been completed, the board evince little interest in the matter, and it is useless to spend time and money on a project that is not likely to be financed.

Central Jail Water-supply. (Revised estimate).—The original fair project for this work was prepared in the year 1924-25, but as the Buildings and Roads department, who had prepared the building project made considerable changes in the details and lay-out of the proposed buildings, a revised estimate was necessary. This was prepared for an independent water-supply for the whole population of the jail of about 2,000 people, at the request of the Deputy Chief Engineer, I circle, Provincial Works, Lucknow.

The estimated cost of the work is Rs. 2·16 lakhs.

Central jail drainage.—A project amounting to Rs. 1,11,351 was prepared in 1927-28. Subsequently the Buildings and Roads branch, who prepared the buildings

MEERUT— (*concld.*).

project, abandoned it and drew up a new project for an entirely different lay-out. This Department consequently had to draw up a fresh scheme.

The estimated cost of the project was over Rs. 2·00 lakhs.

No decision has yet been arrived at regarding the construction of the above works.

MIRZAPUR.

Water-works maintenance.—This water-supply affords several depressing aspects. Although the working charges are among the lowest of all the municipalities, yet the position is bad. The municipal board decline to impose a water-tax, refuse to operate proper ferrule ratings and will not adopt the water-supply rules, laid down by Government.

The board endeavours to meet losses by curtailing the hours of supply and meeting them from revenue derived from octroi.

The Venturi meter which was returned from the makers about a year ago after repairs, has not been installed in its new position in spite of the exhortations of inspecting officers extending over a period of eight years.

The former continuous supply (which has now been made intermittent with resulting increase in demand), it is surmised, has been found impossible owing to the dangers of depleting the reservoir. Since no records of demand, such as those which ought to have been recorded by the Venturi apparatus, exist, steps to deal with the situation are rendered more difficult.

The cost of maintenance of the years working is Rs. 26,364 while the revenue derived is Rs. 31,890 resulting in a profit of Rs. 5,526.

MOGHALSARAI.

Moghalsarai drainage improvement (Rs. 0·33 lakh).—The scheme has been sanctioned by the Board of Public Health, who have given half the amount of the estimate as a grant in aid while the remaining half has been found by the notified area committee itself. Tenders have been invited.

MORADABAD.

Water-supply and drain flushing maintenance.—This supply remained shut down since April, 1930, when the oil engine driving the pump was smashed, beyond repairs. The board decided to substitute an electric motor on the recommendation of inspecting officers, but did not provide funds till 1931. The tenders which were originally received lapsed and fresh tenders had to be invited. Owing to the rise in import duties, prices increased. The contract was let and it is hoped that the system will again function within a short time.

The spares for the pump, ordered by the board, were accepted and taken over only after long correspondence and delay.

The state of the town drains has in the meantime become most obnoxious on account of the lack of water.

MUSSOORIE.

Water-supply maintenance.—The plant at all the four pumping stations were maintained in good running order. Sufficient spares for all the stations were maintained, the replacement of the crank shaft to one of the sets at Mackinnon Springs Station, being the most important item.

The distribution systems were generally well maintained. The supply although sufficient for domestic purposes, does not allow enough for drainage purposes in the hot season. It is stated that the municipal board have not encouraged private house drain connections in the Happy Valley area on this account.

The accounts show a small annual loss to the board in water-supply, this is due to the low credit shown for the value of water supplied, namely annas twelve per one thousand gallons. This credit should be adjusted annually to the actual cost of the water pumped, so that the returns of electricity and water supplies may be susceptible of fair comparison.

Hydro-Electric Supply.—A heavy rainstorm in August, 11·9 inches in 8 hours, resulted in the headworks being entirely blocked with bajri, stones and large boulders and the hydro-electric station at Galogi being out of action for about 24 hours. During this time the auxiliary Diesel station at Kaulagarh took the load.

A serious breach in the power pipe lines was also caused by a landslip. The estimated cost of repairs is Rs. 30,000 inclusive of replacement of pipes. The construction of the new settling tank was also interrupted by the flood and some damage was done.

The board thereupon stopped the work, but they were advised to continue the work and bring the foundations up to a suitable level so that no further damage could be done during floods.

For various reasons which have been reported to Government, the work on the new sedimentation tank has progressed very slowly, but it is hoped to get one of the duplicate tanks ready for use during coming rains. Excessive wear on the Pelton wheels and valves is bound to take place till the reservoir is completed.

The Galogi power house plant has been in continuous service and is in good running order again in spite of the washout of the power pipe lines.

MUSSOORIE—(*concld.*).

The Diesel station at Kaulagarh gave some trouble last year which was traced to the fuel injection system. The fuel system was thoroughly overhauled by the makers, and since then has given excellent service. Spare parts recommended were ordered and adequate provision for other further spares was made in the budget.

The board has done well in deciding to provide a central repair workshop at the Diesel station, and some machine tools and gear have already been purchased. With this workshop, the general overhauling and repair work to electric and pumping plants will be much facilitated.

It is worthy of note that in spite of the general depression and retrenchment in Government departments at Dehra Dun, the hydro-electric supply yielded a net profit of Rs. 74,067, returning nearly 6 per cent. profit on the capital outlay.

The masonry work of suction tanks and pump houses, and power houses remained in satisfactory condition. Sufficient attention was not given to the painting of roofs with the result that some of the roof sheets have been eaten away. The wood work has also been neglected, and it is necessary that proper care be taken of the iron and wood work of all the buildings. The civil work generally compare unfavourably with the electrical and mechanical work.

Triplicate Power Line.—A project has been prepared for a triplicate steel power pipe line from the headworks to the power station and a loan of Rs. 1,50,000 has been sanctioned for this by Government.

Contracts for the materials are being placed through the Indian Stores department and the work is being carried out by the Board's Electrical Engineer, Colonel Bell, to whose efficient service the municipality are much indebted.

Drainage.—Mussoorie drainage formed the subject of a special inspection and report by the Executive Engineer, first division.

There are no less than seven piped systems of drainage in Mussoorie: (1) Happy Valley, (2) Bhilaru, (3) Landour Bazar, (4) Khulri Bazar, (5) Strawberry Bank, (6) Imperial Bank, (7) Telegraph Office and Walnut Grove, of which Happy Valley and Landour Bazar are comparatively recent systems, while Bhilaru sewer was constructed some time ago. With the exception of (7) which requires remodelling, these are well suited for proper house connections.

Very few if any private connections have been made to the Happy Valley sewer and it is stated that the municipal board have not encouraged private connections on account of scarcity of water during the hot season.

Private connections are, however, becoming popular in Landour Bazar and elsewhere and it is necessary that strict supervision should be exercised over the plumbing work. The sanitary arrangements of Landour Bazar and several liquifying tanks sited in other places have been the cause of complaints and require attention.

MUTTRA.

Water-supply maintenance.—Since energy is now derived from the Electric Supply Company, the Diesel sets are merely kept in running order for stand-by purposes.

The delay in appointing a Superintendent for water-works prevented certain recommendations being put into effect.

The Diesel engines, generators, motors and appurtenant gear were all maintained in fair running order. Valves on the suction and delivery pipings of two of the pumps require urgent replacement so that the cost of electric energy wasted in pumping water through leaky joints, may be saved.

There are signs that the board has begun to make some efforts with regard to metering private connections, to realizing arrears, and to improving the water tax assessment.

The addition of a fifth well for the town water-supply, will greatly improve matters in removing complaints of consumers living in the high zone. It would still improve the situation if another tank twenty feet higher than the existing one is constructed and if the new plant is allowed to supply water during non-pumping hours through this tank to the high levels only.

The expenditure on the maintenance amounted to Rs. 82,412 and the income amounted to Rs. 78,019.

Water-supply extension. Tube-well no. 5.—This consists of a new 12" tube well of the strainerless type and pumping plant to augment the supply from the four existing tube wells. The tube well was successfully completed last year. Contracts for the pumping plant and building work have been placed and the building has been practically completed. It is expected that the new pumping plant will be set to work during summer of 1932-33. The town supply will be increased by 300 gallons per minute when this addition is completed.

Sewage pumping station.—The new electro-motor centrifugal pumping sets functioned satisfactorily. The oil engine was also in fair running order but the

MUTTRA—(concld.).

centrifugal pump was not overhauled as recommended. This sewage pumping station is perhaps the most successful yet to set work in the province. The electrically driven sludge elevator and screening gear have shown no defects.

Sewage disposal.—All works in connection with Muttra sewage disposal were completed in 1928. There was a saving of about Rs. 4,000 and out of this about Rs. 3,000 have been spent during the year on a reinforced brickwork lining of the main earthen distribution channel on the sewage farm, a length of 850 feet. It is proposed to utilize the balance on lining another length of 300 feet.

Formerly numerous breaches were occasioned by rats burrowing under the channel in high embankments, which frequently interrupted the supply but no such trouble has been experienced in the lined portion since the work has been completed.

Sewage farm.—The sewage farm which has been established at Muttra in connection with the work of Muttra sewage disposal was handed over to the Executive Engineer first division, for management on behalf of the municipal board for three years ending May 31, 1932.

The Board of Public Health gave a grant of Rs. 7,676 for this work and the farm has proved very successful.

The farm is divided into 24 plots averaging little over two acres each and these plots are auctioned each year to cultivators.

The total revenue assessed for the year 1931-32 amounts to Rs. 5,856 against the sum of Rs. 4,187 for the previous year.

Some delay in realizing the last instalment of rent has been experienced on account of the no-rent agitation and the general remission granted by Government to ordinary cultivators. The case of the Muttra sewage farm is quite different, from that of general cultivation for in the first place it is auctioned annually and the cultivators can bid as they please, as the tenancy is only for one year, they can also more readily estimate the prevailing conditions concerning the sale of their produce.

Government remission, it appears, amounted to seven annas in the rupee on the rental of the land and the tenants of the Muttra sewage farm demanded a similar remission on the total amount of their bid.

Approximately Rs. 100 per acre was the rent of the sewage farm for the year under review, but it must be remembered that this figure includes irrigation water which is delivered to the plots, the manurial value of the sullage, as well as the rent of the land.

The actual rent of the land without sewage which was formerly waste land would probably not amount to more than Rs. 15 per acre, and if any remission of rent is allowed it should be based on this figure.

The sewage farm produce is practically all vegetables for which there is a ready sale and for which no serious drop in price has occurred. On this account no remission is justifiable.

On the tenants being informed that full rents were expected otherwise the sewage supplied for irrigation would be cut off, all arrears were paid.

The Muttra municipal board have recently decided to manage the farm themselves, and it will be handed over on May 31, 1932. At the same time the Executive Engineer will submit a report showing the results of his three years' management.

MUZAFFAR-NAGAR.

New Mandi drainage (Rs. 4·63 lakhs).—A project for this work amounting to Rs. 4·63 lakhs was sanctioned in 1927. Funds to the extent of Rs. 1,03,000 by loan and Rs. 40,000 by Government grant plus Rs. 7,644 contribution by the municipal board were provided and a programme of work to the value of Rs. 1,43,000 was prepared.

Tenders were invited, the contract let and construction was started in August, 1929. Work to the value of about Rs. 1,19,580 excluding fees and contage charges has been completed and handed over to the municipal board. The accounts of the work have, however, not yet been closed.

As pointed out in last year's report many instances of encroachments upon public roads have taken place with the result that the alignment of the roadside drains have been interfered with causing delay and annoyance during construction.

In two cases the house owners dismantled the kerb and channel drains and built chabutras over the alignment.

On road no. 14 these chabutras project about 2′-6″ into the road and although the municipal board have taken the cases up legally, the matter is still pending in the court of appeal. In consequence this road has been omitted from the scheme and no drainage work has been carried out thereon.

The municipal board were advised to realize the cost of the dismantled drains from the house owners concerned but apparently this has not been done. In one case even the materials that were dismantled have been appropriated by the house owner.

MUZAFFAR-NAGAR—(*concld*).

As mentioned in last year's report friction between the municipal board and the Merchants Association in the Mandi appears to be responsible for this unsatisfactory state of affairs.

Although all the work carried out in the Mandi was for the general benefit of the inhabitants and users of the Mandi, yet much impatience was exhibited during the progress of the work. When roads had to be closed for pavements and consolidation, barriers were broken down, road metal scattered, and much obstruction caused to work.

On account of favourable contract rates, it has been possible to carry out more work with the funds available, than was originally contemplated, and some improvements in the proposals have also been effected.

Since the preparation of the project, electric power has been made available in Muzaffarnagar and it has been found possible to improve the drain flushing arrangements. For instance instead of a percolation well and kite motion manual pump, a $2\frac{1}{2}''$ tube-well with strainer has been sunk and a small electro-motor pump has been installed instead of the hand operated kite motion pump.

A 4″ main has been laid along the head of the kerb and channel drain and $\frac{3}{4}''$ connections have been given to provide water for cleaning the drains.

In the original proposals, water for flushing the 15″ sewer was to be obtained from an irrigation distributary.

The new arrangement will ensure a regular supply of water for flushing which in the case of the supply from the canal would not have been possible during closure.

NAINI TAL.

Water-supply maintenance.—Neglect in supervision resulted in the burning out of the motor at the lake side station at a time when scarcity was felt and as a consequence a duplicate set was provided at this station.

At the main pumping station the crank shaft bearings of the high zone pumps require overhauling. These bearings were adversely noted on in inspection last year by the Mechanical Adviser. There can be no doubt that insufficient care was taken in the bedding of the new bearings when they were fitted and adjusted with the result that some of the bearings have been scored and considerable scoring and wear has even taken place on one of the crank pins; indeed this latter wear has been found greater in the last nine months than the reported wear in the previous nine years. In addition to these faulty bearings the middle cross head guide of the no. 6 high zone pump has seized at some time or other and has been ground down more than 1/16th of an inch. This damage was probably caused from defective lubrication.

Since the board's staff apparently could not effect proper repairs the Mechanical Adviser recommended that the crank shafts and bearings on the high zone pumps, should be sent to Calcutta or Bombay for repairs.

Many signs showed that the board's plant was not receiving adequate attention and was relapsing at an alarming rate into a precarious condition.

Hydro-electric supply.—The intake chamber, power pipe lines, anchor blocks and receivers at the power house, which did not require much attention remained in fair running order.

The Lea Recorder indicates between 8 and 18 per cent. less consumption of water than gauged by the depth flowing over the V-notch. Recommendations were made on previous inspections that a scale or gauge should be fitted in the stilling chamber above the weir to check at any time the accuracy of the depth measured by the recorder. This simple precaution did not receive attention until the new Electrical Engineer arrived. In addition to this gauge a proper hook gauge with Vernier should be provided to carry out accurate tests as occasion demands.

Judging from the scanty rainfall and lake gauge levels a cycle of dry seasons is in process; this then is an opportune time to take stock of the supplies available for augmenting the lake, such as the Gaumukh dhara and the Sepahi dhara springs. It would be of great assistance to engineers in later years if the dry weather flow of such source was measured and recorded.

A passing inspection of the overhead work especially private connections discloses much unsatisfactory work. In no. 3 sub-station the new Electrical Engineer has discovered one transformer whose tappings were wrongly connected to the system. The alternator bearings at the Durgapur power station are much worn and require renewal at an early date. The hydraulic relief valves also require overhauling at this station.

The total annual maintenance charges including interest and sinking fund for the hydro-electric undertaking amounted to Rs. 1·89 lakhs, the income was Rs. 1·81 lakhs, resulting in a loss of over Rs. 8,000.

For the water supply undertaking the annual maintenance charges including interest and sinking fund amounted to Rs. 86,000 whilst the income derived was Rs. 95,000 thereby yielding a profit of over Rs. 9,000. If the actual cost of power

NAINI TAL—(concld.).

delivered to the pumping stations was charged at 3·78 annas instead of 3·00 annas per unit the electric supply and the water-supply would be each barely self-supporting.

Over 30 per cent. of the units generated cannot be accounted for and the number of units which are supplied free for various purposes totals to over 10 per cent. of the number of units sold.

PIRAN KALIAR.

Water-supply.—This work consists of a tube-well yielding 100 gallons per minute from which water is lifted by means of an air lift pump and compressor and delivered to pilgrim tanks by means of an horizontal electro-motor centrifugal pump. The work included the pump house, suction pump, eduction chamber and the necessary distribution pipes.

The installation is designed to supply water to the mela which assembles at the Durgah once a year.

The estimate for this work amounting to Rs. 39,837 was sanctioned in the year 1928 and the work was commenced in January, 1930.

The work was completed in August, 1931, and the plant was tested by the Water-Works Engineer and Mechanical Adviser to Government on August 5, 1931.

An abundant supply of water was provided for the mela of 1930.

On completion of the work it was proposed to hand the plant over to the Irrigation branch for maintenance, who would use the well as a demonstration irrigation tube-well, but this so far has not been possible on account of objections raised by the Sajjada Nashin Sahib who requests custody of the plant. Decision of Government is still awaited on this question.

RIKHIKESH.

Water-supply.—There is no piped water supply in Rikhikesh. Water is obtained from a spring, wells and the river.

The spring exists which could easily be utilized for a water-supply and which affords at least one hundred gallons per minute.

Drainage maintenance.—The sewers of Rikhikesh were reinstated by the Executive Engineer, First Division, in 1924. Since that date they have been operated satisfactorily, and the object of the work, namely, to prevent pollution of the bathing ghats, has been attained.

When recently noticed, certain defects were pointed out to the Notified Area Committee and it is understood that the repairs have been undertaken.

An estimate for Rs. 33,039 for Rikhikesh Infectious Diseases Hospital was prepared and sanctioned. Construction was started in the month of March, 1931, and the work was completed in November, 1931; the whole cost being met by a grant from the Board of Public Health.

A covered masonry well provides the water supply to the hospital and an Ashford's hand pump, capable of lifting about four gallons per minute is used with success.

The buildings were handed over to the Notified Area Committee before the end of November, 1931.

UNAO.

Water-Supply Maintenance.—The pumping plant installed under the extension scheme was handed over to the board on October 1, 1931, and has since been operated very satisfactorily. With the addition of the new plant, the original set which had to run for long periods daily without a standby, has been much relieved and it is now possible to effect necessary repairs.

The third tube-well which was brought into use this year has also worked satisfactorily. All those wells now are operated simultaneously, thereby reducing the working depression on each.

The capacity of the service reservoir has also been increased to enable the pumps to deal more easily with the peak demand during the summer months.

The municipal board were given a loan of Rs. 10,000 for metering all connections. Tenders for the supply of meters were invited and the offers are under consideration of the Board. It is expected that there will be an appreciable increase in revenues from water-supply when the metering is completed.

A strict watch must be maintained over both private connexions and the distribution system even after all connexions are metered, if the success of the supply is to be maintained.

Drainage (estimated cost Rs. 1·89 lakhs).—Tenders were called for and the contract for this work has been placed. The construction work is well in hand and includes a sewage pumping station and farm.

Unao is now abreast of several and in advance of many larger towns in possessing water-supply under ground drainage and sewage disposal systems.

Besides the above works other miscellaneous works such as proposals for Ramtagh water-supply, Puranpur drainage, Pilibhit district jail water-supply, Sandila market, type designs for hide curing and tanning godowns and other works have been undertaken.

In addition to the works noted above, this department has scrutinized and given advice under G. O. no. 1015/XI—91, dated April 3, 1930, to the local authorities concerning their tender forms for works, some of which are enumerated below :—

1. *Allahabad municipal board.*—Tender for supply of macadam, (2) Consolidation, (3) and painting of road surfaces.

2. *Cawnpore municipal board.*—(1) Type specifications for drainage works, (2) construction of Sarsaya Ghat sewer, (3) improvement of Sisa-mau Nala, (4) proposals for waste prevention in water-supply.

3. *Unao municipal board.*—Supply of meters.

4. *Brindaban municipal board.*—Construction of a primary school.

5. *Agra municipal board.*—(1) Advice regarding conversion of some buildings into an Infectious Diseases Hospital, (2) inspection and report on Shahganj drainage.

6. *Hardwar Union board.*—Advice regarding the probable cost of a Kotwali for Mela purposes.

7. *Saharanpur municipal board.*—Drainage work.

STAFF.

The post of the Superintending Engineer was held throughout the year by Mr. G. McC. Hoey and that of his personal assistant by Mr. J. K. Singh, till June 24, 1931, when he was relieved by Mr. H. G. Trivedi, on his return from England after a year's training there.

Mr. F. J. Mallett held the post of Water-Works Engineer and Mechanical Adviser to Government throughout the year and Mr. N. R. Gupta worked as his assistant.

Mr. F. D. Tunnicliffe was attached to the office of the Superintending Engineer up to April 7 when he proceeded on six months' combined leave and took over charge on October 23, from Mr. S. G. Narvane, who held charge of II Division, vice Mr. G. K. Pillai.

Mr. W. Saise continued as Executive Engineer, I Division, Public Health department, Meerut, and Mr. N. D. Chowdhary, as Executive Engineer, Well Boring Operations Division, Cawnpore, throughout the year.

Mr. S. B. Mathur, permanent Executive Engineer, remained attached to the I Division, Public Health department, Meerut, but has been absent on sick leave.

Khan Sahib Mohammad Barkatullah Khan, one of the six permanent assistant engineers, retired and this post has been held in abeyance.

In addition to the above five permanent assistant engineers of Public Health Engineering Service, five temporary assistant engineers, nine subordinates and ten temporary subordinates and the requisite number of computors, draftsmen and clerks were employed.

Superintending Engineer inspected all important water-works as well as works under construction and the Mechanical Adviser to Government recorded his periodical detailed inspection reports of all open water-works and rendered assistance in preparing specifications, advising on tenders and testing plant.

The Superintending Engineer throughout the year served on the Board of Public Health and also on the Board of Engineers nominated by Government to advise the Kashi Sudhar Trust in regard to the restoration of the Benares Ghats.

Superintending Engineer and Mechanical Adviser also acted as Government nominees on the Senate of Benares University.

Members of the staff also rendered assistance to Roorkee Civil Engineering College and Lucknow University when duties permitted, in giving lectures and acting as examiners in engineering subject.

14-6-1932.

G. McC. HOEY, M. INST. C.E.,
Superintending Engineer,
Public Health department,
United Provinces.

APPENDICES.

APPENDIX

Statement of operations of various water-works in the

Item number.	Particulars.	Agra.	Allahabad.	Benares.	Cawnpore.	Lucknow.	Meerut.	Mussoorie.	Naini Tal.
	Population.								
1	By census of 1931 in municipality.	205,487	173,895	201,037	219,189	251,097	91,181	11,040	13,558
2	By census of 1931 in cantonments	24,277	10,019	4,278	24,566	23,562	45,528	2,017	1,233
3	Inhabitants drawing their supply from mains.	229,764	183,914	205,315	243,755	218,000	91,181	13,057	14,791
	Consumption of water.								
4	Metered supplies :—								
	(*a*) Cantonments, million gallons.	147·403	89·739	1·303	8·208	126·320	Nil	5·971	1·295
	(*b*) Trade, million gallons ..	60·783	26·956	1·260	316·066	149·079	16·527	Nil	0·195
	(*c*) Domestic (bungalows, etc.), million gallons	97·601	27·788	27·010	448·044	111·420	1·400	46·621	19·958
	(*d*) Buildings, million gallons	0·746	9·679	18·922	46·479	51·764	0·105	Nil	0·436
	Total metered supplies, million gallons.	306·533	154·162	48·495	818·797	438·583	18·032	52·592	21·219
5	Unmetered supplies :—								
	(*a*) Domestic (assessment or ferrule), million gallons	1,305·179	1,058·544	2,026·199	1,751·862	1,183·023	262·532	11·505	30·352
	(*b*) Municipal purposes (road watering, irrigation and flushing, etc.), million gallons.	175·950	420·510	199·963	383·801	598·133	3·459	15·940	10·058
	(*c*) Standposts, million gallons	245·789	453·661	506·550	223·600	584·086	199·728	46·019	10·117
	(*d*) Buildings, million gallons	2·619	15·795	7·383	20·290	1·073	Nil	3,895	0·034
	Total unmetered supplies, million gallons.	1,729·537	1,948·540	2,740·095	2,379·549	2,366·619	465·719	76·699	50·561
6	Total quantity supplied during the year (items 4 and 5), million gallons.	2,036·070	(*a*)2,102·702	2,788·590	3,198·340	2,805·202	483·751	(*b*)129·291	(*c*)71·780
7	Daily average supply, million gallons.	5·563	5·745	7·619	8·738	7·664	1·322	0·353	0·196
8	Maximum daily average in any one month, million gallons.	6·951	7·074	8·151	10·765	9·716	1·463	0·423	0·200
9	Consumption per head per day for trade alone, gallons	0·72	0·40	0·02	3·54	1·87	0·50	Nil	0·02
10	Consumption per head per day for municipal purposes and buildings, gallons.	2·13	6·63	3·01	5·05	8·16	0·11	4·01	1·95
11	Consumption per head per day for domestic purposes, gallons.	21·36	24·21	34·08	27·26	25·13	13·89	23·04	11·29
12	Total consumption per head per day (items 9, 10 and 11), gallons.	24·21	31·24	37·11	35·85	35·16	14·50	27·05	13·26
13	Hours of daily supply ..	10·00	15·00	8·48	16·40	18·50	18·42	24·00	15·10
14	Total hours of pumping during the year.	9,806·00	11,450·75	7,859·75	15,100·00	10,842·85	6,735·16	13,303·50	5,526·85
	Lift of Pumps.								
15	From river to settling tanks, feet	48·93	122·36	87·99	34·99	95·99	15·16	Murray 1,811·50	H.Z. 1,148·30
16	From filtered water pumps to town distribution, feet.	142·00	109·45	88·51	93·73	62·20	129·51	Mackinon 689·00 Bhilaru 1,385·68	I.Z. 451·60 L.Z. 252·60
17	Total lift, feet.	190·93	225·81	176·50	128·72	158·19	144·67	Average 1,343·02	Average 482·11
18	Total horse power hours during the year in million.	1·46	1·10	1·25	1·51	0·88	0·82	0·88	0·18

(*a*) Includes Mayo Hall Pumping 2·623 million gallons.
(*b*) Includes gravity supply 4·750 million gallons.
(*c*) Includes gravity supply 18·710 million gallons.

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United Provinces for the year 1931-32.

Dehra Dun.	Jhansi.	Mirzapur.	Muttra.	Fyzabad.	Hardwar.	Unao.	Kosi.	Fatehpur-Sikri.	Aligarh.	Remarks.
40,409	64,591	61,131	60,590	59,992	33,287	16,232	7,294	6,998	33,878	
9,721	12,121	Nil	3,439	5,726	Nil	Nil	..	Nil	Nil	
40,409	35,961	42,700	59,441	35,000	11,535	13,000	7,294	6,152	35,000	
Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	
0·175	1·052	8·909	1·150	Nil	0·264	Nil	0·449	Nil	Nil	
7·722	1·978	1·063	1·478	10·447	1·305	0·700	0·249	Nil	Nil	
Nil	0·022	Nil	0·055	0·454	0·870	Nil	Nil	Nil	Nil	
7·897	3·052	9·972	2·683	10·901	2·439	0·700	0·698	Nil	Nil	
102·404	5·076	156·461	102·138	50·605	41·125	49·992	Nil	Nil	16·597	
	2·000	42·376	25·211	11·202	7·784		Nil	Nil	Nil	
	50·266	105·687	118·006	50·011	29·245		17·902	12·606	49·200	
	Nil	11·963	4·835	30·593	0·045	Nil	0·031	Nil	Nil	
102·404	57·342	316·492	249·690	172·411	78·199	49·992	17·983	12·606	65·797	
110·301	60·394	326·464	252·373	183·312	80·638	50·692	18·681	12·606	65·797	
0·301	0·105	0·892	0·693	0·501	0·220	0·133	0·051	0·034	0·130	
0·460	0·190	1·053	0·805	0·577	0·278	0·166	0·066	0·043	0·242	
0·01	0·08	0·57	0·05	Nil	0·06	Nil	0·17	Nil	Nil	
7·45	0·15	3·48	1·36	3·20	2·06	10·65	0·03	Nil	Nil	
	4·36	16·84	10·19	11·01	16·98		0·80	5·60	5·14	
7·46	4·59	20·89	11·60	14·21	19·10	10·65	7·00	5·60	5·14	
24·00	8·75	19·00	6·50	0·25	17·00	10·00	10·00	8·00	6·00	
Nil	3,203·30	Nil.	5,201·93	7,945·78	3,572·50	4,307·50	2,452·50	1,982·00	3,285·00	
Gravity supply.	214·81	Gravity supply.	143·88	Old pumps 181·60 New pumps 105·61	175·82	130·00	111·61	204·68	144·00	
..	214·81	..	143·88	Average 185·91	175·82	130·00	111·61	204·68	144·00	
Nil	0·07	Nil.	0·18	0·18	0·07	0·03	0·01	0·01	0·05	

APPENDIX

Statement of operations of various water works

Item number.	Particulars.	Agra.	Allahabad.	Benares.	Cawnpore.	Lucknow.	Meerut.	Mussoorie.	Naini Tal.
	Supply connexions.								
	Unmetered.—								
19	Number of connexions made during 1931-32.	194	343	599	634	781	103	Nil	Nil
20	Total number of connexions..	5,250	6,707	15,789	10,114	11,206	2,066	16	7
	Metered.—								
21	Number of house connexions made during 1931-32.	5	34	15	163	Nil	Nil	26	12
22	Total number of house connexions.	236	323	136	1,504	421	16	524	353
23	Number of trade connexions made during 1931-32.	1	5	1	1	8	2	Nil	Nil
24	Total number of trade connexions.	141	45	41	137	90	23	Nil	15
	Annual charges and cost of water supplied								
25	Maintenance charges, Rupees.	1,68,940	2,25,333	2,31,457	3,08,931	2,30,739	37,897	84,003	59,976
26	Interest and sinking fund charges, „	66,568	1,49,814	88,090	34,522	1,57,372	Nil	41,640	25,589
27	Total charges .. „	2,35,508	3,75,147	3,19,557	3,43,453	4,38,111	37,897	1,25,643	85,565
28	Cost per 1,000 gallons per 100 feet lift. Annas	0·70	0·76	0·75	1·20	1·01	0·36	0·77	2·77
29	Cost per 1,000 gallons maintenance charges. „	1·33	1·71	1·33	1·55	1·60	1·25	10·40	13·37
30	Cost per 1,000 gallons interest and sinking fund charges. „	0·52	1·14	0·50	0·17	0·90	Nil	5·15	5·70
31	Total charges per 1,000 gallons (items 29 and 30). „	1·85	2·85	1·83	1·72	2·50	1·25	15·55	19·07
	Income from water-works.								
32	**Unmetered.**—								
	(a) Water rate recovered (assessment or ferrule). Rupees	1,71,817	3,46,028	2,67,216	4,03,329	3,56,642	26,370	10,357	46,872
	(b) Amount credited to water-works for water used for municipal purposes. „	21,993	36,000	49,391	Nil	1,608	2,232	Nil	11,944
	(c) Buildings and other receipts. „	5,922	15,928	23,710	6,281	43,368§	785	2,714	1,092
	Total .. „	1,99,732	4,07,956	3,39,917	4,14,510	4,01,318	29,387	13,071	59,908
33	**Metered.**—								
	(a) Sale of water by meter. „	86,541	59,185	10,594	1,60,153	1,54,631	5,368	31,902	32,663
	(b) Meter rent .. „	2,585	4,011	2,174	17,449	7,592	100	2,048	2,464
	Total .. „	89,126	63,196	12,768	1,77,602	1,62,273	5,468	33,950	35,127
34	Total income (items 32 and 33). „	2,88,858	4,71,152	3,52,685	5,92,112	5,64,091	34,855	97,021	95,036
	Income and working charges.								
35	Receipt per 1,000 gallons supplied through meter. Annas.	4·65	5·56	4·21	3·47	5·92	4·85	25·54	26·49
36	Receipt per 1,000 gallons supplied through assessment rating. „	1·85	3·35	1·98	2·79	2·72	1·01	2·73	18·96
37	Receipt per 1,000 gallons on total consumption. „	2·27	3·55	2·02	2·96	3·22	1·15	12·01	21·18
38	Profit or loss per 1,000 gallons supplied. „	Profit 0·42	Profit 0·72	Profit 0·10	Profit 1·24	Profit 0·72	Loss 0·10	Loss 3·54	Profit 2·11
39	Profit or loss on year's working. Rupees.	„ 58,350	„ 96,005	„ 33,128	„ 2,43,559	„ 1,25,980	„ 3,042	„ 28,622	„ 9,479

§ Includes Rs. 25,000 Government subsidy.

No. I.

in the United Provinces for the year 1931-32—(concluded).

Dehra Dun.	Jhansi.	Mirzapur.	Muttra.	Fyzabad.	Hardwar.	Unao.	Kosi.	Fatehpur-Sikri.	Aligarh.	Remarks.
Nil	20	108	97	80	11	47	Nil	Nil	394	
1	101	2,754	1,338	1,218	196	208	2	Nil	394	
3	1	Nil	3	2	Nil	Nil	4	Nil	Nil	
55	7	9	9	43	11	2	8	Nil	Nil	
Nil	Nil	Nil	1	Nil	1	Nil	Nil	Nil	Nil	
2	2	29	9	Nil	3	Nil	3	Nil	Nil	
10,186	14,495	4,576	64,062	31,846	21,388	7,183	4,840	3,151	17,967	
12,873	Nil	21,788	18,350	11,426	11,424	Nil	Nil	Nil	38,282	
23,059	14,495	26,364	82,412	43,272	32,812	7,183	4,840	3,151	56,249	
Nil	1·79	Nil	2·82	2·04	2·42	1·75	3·71	1·95	3·03	
1·48	3·84	0·22	4·06	2·78	4·24	2·27	4·14	4·00	4·37	
1·86	Nil	1·07	1·16	1·00	2·27	Nil	Nil	Nil	9·31	
3·34	3·84	1·29	5·22	3·78	6·51	2·27	4·14	4·00	13·68	
Nil	14,969	27,337	66,684	40,103	17,103	6,579	8,184	1,913	3,021	
Nil	1,000	Nil	7,658	2,500	2,964	Nil	Nil	Nil	Nil	
2,985	131	1,953	3,276	1,010	30,342*	390	97	Nil	2,310	
2,985	16,100	29,290	77,609	43,613	50,409	6,969	8,281	1,913	5,331	
10,594	1,385	2,328	298	584	1,842	663	115	Nil	Nil	
5	48	277	112	512	159	15	23	Nil	Nil	
10,599	1,433	2,600	410	1,096	2,001	678	138	Nil	Nil	
13,584	17,533	31,890	78,019	44,709	52,410	7,647	8,419	1,913	5,331	
21·47	7·51	4·17	2·44	1·01	13·13	15·50	3·16	Nil	Nil	
0·47	4·49	1·43	4·17	4·05	10·31	2·23	7·37	2·43	1·30	
1·97	4·64	1·56	4·94	3·90	10·40	2·41	7·21	2·43	1·30	
Loss 1·37	Profit 0·80	Profit 0·27	Loss 0·28	Profit 0·12	Profit 3·89	Profit 0·14	Profit 3·07	Loss 1·57	Loss 12·38	
„ 9,475	„ 3,038	„ 5,526	„ 4,393	„ 1,487	„ 19,598	„ 404	„ 3,579	„ 1,238	„ 50,918	

* Includes Rs. 30,000 received from fair fund.

APPENDIX No. I(A).

Statement showing total demand, amount recovered, remissions and arrears of various water-works in the United Provinces during the year 1931-32.

Water-works Stations.	Total demand.	Total amount recovered.	Total amount of remissions.	Arrears on March 31, 1932.		Remarks.
				Total amount.	Percentage.	
	Rs.	Rs.	Rs.	Rs.	Rs.	
1. Agra	4,57,807	2,88,858	15,231	1,53,718	33·58	
2. Allahabad ..	5,66,731	4,71,152	21,685	73,894	13·04	
3. Benares ..	5,07,708	3,52,635	8,595	1,46,428	28·84	
4. Cawnpore ..	7,48,419	5,92,112	35,539	1,20,768	16·14	
5. Lucknow ..	5,73,916	5,64,091	52	9,773	1·70	
6. Meerut ..	46,534	34,355§	4,559	7,132	15·34	
7. Mussoorie ..	1,04,149	97,021	778	6,350	6·10	
8. Naini Tal ..	1,00,996	95,035	47	5,914	5·86	
9. Dehra Dun ..	13,947	13,584	16	347	2·49	
10. Jhansi ..	19,000	17,533*	123	1,358	7·15	
11. Mirzapur ..	52,130	31,890	414	19,876	38·09	
12. Muttra ..	92,646	78,019	2,163	12,464	13·45	
13. Fyzabad ..	50,576	44,709†	3,134	2,871	5·70	
14. Hardwar ..	53,299	52,410‡	331	559	1·05	
15. Unao.. ..	13,498	7,647	240	5,611	41·57	
16. Kosi	9,706	8,419	804	513	5·24	
17. Fatehpur Sikri ..	2,893	1,913	114	866	29·93	
18. Aligarh ..	6,005	5,331	Nil	674	11·22	
Total ..	34,20,094	27,57,264	93,879	5,69,116	16·64	

*Excess recovery Rs. 14.
†Excess recovery Rs. 138.
‡Excess recovery Rs. 1.
§Excess recovery Rs. 12.

APPENDIX No. I(B).

Statement showing number and size of all connexions ; also number and size of metered connexion for the year 1931-32.

Name of stations.	Size of connexions.																			Remarks.
	1/8"	3/16"	1/4"	3/8"	1/2"	5/8"	3/4"	1"	1¼"	1½"	2"	3"	4"	6"	8"	10"	12"	Unknown connexions.	Total.	
Unmetered supplies.																				
Agra	842	..	899	2,761	505	..	157	72	..	14	..	..	..	..	..	..	..	..	5,250	
Allahabad	810	..	1,274	3,046	1,364	60	48	86	..	10	9	..	..	..	..	..	..	..	6,707	
Benares	3,635	..	10,186	986	903	14	19	22	4	1	19	..	..	..	..	..	..	..	15,789	
Cawnpore	..	651	4,484	2,592	1,466	8	400	440	23	93	..	..	..	..	..	..	..	7*	10,114	* T Connexions.
Lucknow	..	..	..	9,479	1,320	103	167	116	12	2	2	..	..	..	..	..	..	..	11,206	
Meerut	..	..	..	1,585	450	..	21	10	..	..	..	..	..	..	..	..	..	..	2,066	
Mussoorie	..	..	..	..	16	..	..	..	..	..	..	..	..	..	..	..	..	..	16	
Naini Tal	..	..	..	..	1	..	2	1	1	..	2	..	..	..	..	..	..	..	7	
Dehra Dun	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	1	
Jhansi	..	..	8	..	81	..	5	2	..	1	4	..	..	..	..	..	..	..	101	
Mirzapur	20	..	312	1,604	508	6	190	62	51	..	..	1	..	..	..	..	..	..	2,754	
Muttra	542	..	1,160	79	105	..	2	..	..	..	..	..	..	..	..	..	..	..	1,888	
Fyzabad	886	..	211	67	54	..	..	..	..	..	..	..	..	..	..	..	..	..	1,218	
Hardwar	67	..	65	8	56	..	..	..	..	..	..	..	..	..	..	..	..	..	196	
Unao	95	..	77	25	10	..	1	..	..	..	..	..	..	..	..	..	..	..	208	
Kosi	..	..	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	
Fatehpur Sikri	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
Aligarh	185	160	43	6	..	..	..	..	..	..	..	..	..	..	..	..	..	..	394	
Total ..	7,082	811	18,669	22,239	6,840	196	1,012	812	91	121	36	1	..	..	..	..	..	7	57,917	
Metered supplies.																				
Agra	3	..	19	62	128	..	83	88	..	25	2	6	..	5	2	..	1	..	377	
Allahabad	..	..	..	2	123	46	84	57	..	12	18	9	15	2	..	..	..	..	373	
Benares	..	..	..	..	97	..	26	27	11	9	5	4	1	..	..	..	..	..	177	
Cawnpore	..	..	..	..	803	..	221	365	9	148	49	36	10	..	..	..	..	..	1,641	
Lucknow	..	..	..	..	221	..	105	115	..	42	15	6	5	..	1	..	..	1†	511	† 15" Connexion.
Meerut	..	..	..	..	29	..	3	5	..	..	..	2	..	..	..	..	..	..	39	
Mussoorie	..	..	..	..	465	..	51	6	..	..	..	2	..	..	..	..	..	..	524	
Naini Tal	..	..	..	..	101	250	17	4	..	1	..	..	..	..	..	..	..	..	373	
Dehra Dun	..	..	..	..	37	..	4	14	..	2	..	..	..	..	..	..	..	..	57	
Jhansi	..	..	..	..	..	..	1	2	..	2	3	..	..	..	..	..	..	..	9	
Mirzapur	..	..	..	..	5	..	20	10	..	3	..	..	..	..	..	..	..	..	38	
Muttra	3	..	6	..	6	..	..	..	..	3	..	..	..	..	..	..	..	..	18	
Fyzabad	..	..	1	..	19	..	12	11	..	..	..	..	..	..	..	..	..	..	43	
Hardwar	..	..	2	..	10	..	1	1	..	..	..	..	..	..	..	..	..	..	14	
Unao	..	..	..	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..	2	
Kosi	..	..	..	..	9	..	..	2	..	..	..	..	..	..	..	..	..	..	11	
Fatehpur Sikri	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
Aligarh	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
Total ..	6	..	28	64	2,059	296	629	657	20	248	92	65	31	7	3	..	1	1	4,207	

APPENDIX

Annual maintenance accounts of

Particulars.	Agra.	Allahabad.	Benares.	Cawnpore.	Lucknow.	Meerut.	Mussoorie.
I.—Establishment.—							
(a) Pumping	17,936	32,471	25,386	21,230	41,468	10,300	12,113
(b) Workshops ..	4,928		11,928	5,566		..	..
(c) Settling tanks and filters.	489	5,603	324	11,396		600	..
(d) Inlet chambers, well and grounds, etc.	..		..	..		..	..
(e) Distribution ..	10,007	12,237	16,052	16,216		4,158	1,598
(f) Clerical staff ..	1,880	Included in (a).	4,759	3,335		1,408	..
(g) Menial staff ..	9,055	do.	1,163	776		1,018	11,385
(h) Office contingencies ..	2,825	1,079	641	498	1,832	1,304	2,962
(i) Rent	410		535	675	710	60	10
II.—Fuel, lubricants and stores.—	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(a) Fuel (coal, fuel oil or electric energy).	81,294	1,51,330	1,48,760	1,30,904	1,66,296	..	47,908
(b) Lubricating oil ..	5,944	2,330	554	734	656	150	..
(c) Waste	639		678	..		249	47
(d) Packing	138	1,497	62	..	2,346	202	..
(e) Petty stores ..	6,435		3,166	2,085		967	1,460
III.—Intake.—							
(a) Training river ..	5,316	..	7	..	..	..	..
(b) Cleaning channels and wells.	3,800	..	..	..	392	80	..
IV.—Settling tanks and filters.—							
(a) Cleaning settling tanks and wells.	736	..	2,588	7,204	16,856	90	..
(b) Cleaning and renewing filter-beds.	6,675	19,294	3,009	16	8,491	893	..
(c) Purchase of sand ..	5,844		2,475	..	23,936	1,375	..
(d) Purchase of alumino-ferric.	1,202		4,924	8,161	Included in (a)	4,918	..
V.—Distribution.—							
(a) Pipes and fittings ..	1,242	2,058	614	7,090	4,316	499	4,659
(b) Meters	194		16	10,601	819	..	3,584
(c) Standposts or hydrants	..		..	..	..	..	..
VI.—Repairs.—							
(a) To tanks	350	Included in IV(b) to IV(d.)	..	9	..	..	1,035
(b) To buildings and grounds.	2,012	894	2,480	133	2,832	1,250	335
(c) To machinery ..	793	1,317	741	1,849	7,534	1,913	6,593
(d) To rising main ..	..	..	25	..	..	..	..
(e) To tools and plant ..	44	..	..	3,072	..	..	..
VII.—Water analysis ..	..	1,123	1,080	1,394	2,361	800	929
VIII.—Cost of water.—							
Canal department dues ..	1,000	..	..	75,000	..	5,558	..
Total ..	1,68,740	2,25,339	2,31,467	3,08,931	2,80,739	37,897	84,008
Interest and sinking fund charges	66,568	1,49,814	88,090	34,522	1,57,372	..	41,640
GRAND TOTAL ..	2,35,508	3,75,147	3,19,557	3,43,453	4,38,111	37,897	1,25,643

(1) Rupees 3,961 less on consumption. Electrical charges for Maithan and Chilli-lut Rs. 1,285 and for raw water Rs. 16,531. Cost of fuel oil Rs. 13,281.
(2) Rupees 1,206 in excess of consumption. Cost of coal for workshop, etc. Rs 1,982 and fuel oil for Daraganj tube well Rs. 1,594. Electrical charges for Mayo Hall Rs. 486.
(3) Rupees 10,637 less on consumption. Cost of coal for tube wells etc., Rs. 5,577.
(4) Rupees 6,850 in excess of consumption. Coal worth Rs 873 was used for workshop and municipal purposes.
(5) Rupees 17,674 less on consumption. Cost of coal for workshop and municipal purposes Rs. 153.
(6) Pumping done by turbine. No fuel was purchased during the year. Last year's stock was used for banking engines and workshop.
(7) Electrical charges

No. II.

water-works during the year 1931-32.

Naini Tal.	Dehra Dun.	Jhansi.	Mirzapur.	Muttra.	Fyzabad	Hardwar.	Unao.	Kosi.	Fatehpur-Sikri.	Aligarh.
	..	2,909		7,178	6,669	2,690	1,718	952	1,275	2,809
	..	..		694	2,259	1,630	..	..	..	..
	..	..	2,800	..	..	..	..	..	..	..
6,442	..	..		..	..	..	..	..	..	..
	..	..		2,316	2,777	2,625	564	695	182	730
	2,177	..	380	..	778	600	..	540	..	..
	4,780	..	680	354	1,492	464	282	354	311	403
490	62	227	28	1,350	970	644	76	203	41	38
..	..	..	..	..	..	..	6	..	52	..
(8) 43,444	..	(9) 6,048	..	(10) 49,603	(11) 11,028	(12) 12,199	(13) 2,192	(14) 977	(15) 638	(16) 12,535
890	..	217	..	322	3,913	48	1,418	380	282	105
42	..	13	..	..	..	20	118	31	64	..
220	..	99	..	28	..	25	..	..	23	25
346	..	159	..	160	323	150	174	200	118	351
..	..	68	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..
									2	..
..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..
..	..	..	192	..	..	..	..	..	..	..
1,533	3,045	*383	..	103	37	144	..	101	13	..
88	..	5	..	..	..	..	..	..	..	..
..	..	..	..	674	..	..	..	..	30	132
84	..	..	73	499	..	..	..	4	..	..
690	..	27	24	77	320	110	21	..	20	6
3,877	..	333	..	682	1,490	..	217	190	80	39
24	..	100	125	..	..	..	..	62	..	..
191	..	15	272	22	..	39	..	106	..	200
1,616	122	159	62	..	331	..	397	45	..	589
..	..	3,823	..	..	..	..	..	..	..	..
59,976	10,186	14,495	4,576	64,062	31,846	21,388	7,183	4,840	3,151	17,967
25,589	12,873	..	21,788	18,350	11,426	11,424	..	..	..	38,282
85,565	22,059	14,495	26,364	82,412	43,272	32,812	7,183	4,840	3,151	56,249

* Includes Rs. 116 for repairs of wells and providing pulleys thereon and Rs. 19 wages of a water-man for a *pilâo*.

(8) Electrical charges.
(9) Rupees 890 less on consumption.
(10) Electrical charges. Fuel oil worth Rs. 131 was used for pumping water by Diesel engine and municipal purposes. Rs. 2,477 in excess of consumption.
(11) Rs. 2,081 in excess of consumption.
(12) Electrical charges.
(13) Rupees 101 less on consumption.
(14) Rupees 17 in excess of consumption.
(15) Rupees 39 ditto.
(16) [illegible] Rs. [illegible] less on consumption.

APPENDIX No. III.

Statement showing costs, initial of subsequent extensions and improvements, chargeable to capital on the various water-works in the United Provinces for the year ending March 31, 1932.

Water-works stations.	Initial capital cost.	Cost of subsequent extension, etc.	Expenditure during the year 1931-32.	Total.
	Rs.	Rs.	Rs.	Rs.
Agra	11,70,761	23,76,921	31,137	35,78,819
Allahabad	16,24,051	28,17,063	51,734	44,92,858
Benares	25,61,881	18,32,779	7,896	44,02,346
Cawnpore	14,44,370	21,81,093	37,055	36,62,718
Lucknow	15,15,736	48,95,931	53,300	64,65,017
Meerut	7,51,710	69,635	1,450	8,22,795
Mussoorie	4,79,754	8,02,503	5,351	12,87,607
Naini Tal	2,47,000	8,01,614	2,736	10,54,350
Dehra Dun	97,241	3,81,324	Nil	4,78,565
Jhansi	96,556	97,226	7,278	2,01,060
Mirzapur	5,98,492	1,35,601	6,653	7,10,746
Muttra	5,17,288	1,04,257	8,074	6,29,619
Fyzabad	9,48,662	46,275	36,663	10,31,600
Hardwar	1,96,919	2,86,276	8,255	4,91,450
Unao	1,18,664	25,262	32,371	1,76,297
Kosi	70,322	979	73	71,374
Fatehpur Sikri	52,084	Nil	6,678	58,707
Aligarh	5,70,902	828	17,586	5,89,306
GRAND TOTAL ..	1,30,62,646	1,68,68,846	3,14,745	3,02,46,734

APPENDIX No. IV.

Statement showing filter area out of operation, rate of filtration, and results of water analyses of the water-works in the United Provinces during the year 1931-1932.

Water-works.	Sand filter area out of operation per million gallons pumped sq. feet.	Filtration rate in gallons per square foot per day of sand filter.			Water from supply mains.						
					Chemical analyses.			Bacteriological analyses.			
		Maximum.	Minimum.	Average.	Good.	Bad.	Total.	Number of samples tested.	Number of samples containing over 100 colonies.	Average number of microbes per c.c.	Percentage (on total) of samples over 100 per c. c.
Agra	3,561	34·00	25·00	31·75	4*	0	4	506	1	36·66	0·2
Allahabad ..	8,917	62·00 †2,060	8·00 †907	26·21 †1,488	3*	1	4	496	11	30·69	2·2
Benares ..	3,704	50·00	37·50	47·45	3	0	3	475	7	76·51	1·5
Cawnpore ..	213	63·00	14·00	45·10	2	2	4	708	0	19·82	0·0
Lucknow ..	15,278	71·70 †2,217	6·20 †108	43·12 †1,399	4	0	4	209	3	34·59	1·4
Meerut ..	3,967	31·00	25·00	30·50	5	0	5	252	0	32·35	0·0
Mussoorie ..	Water-supply from deep springs and is not filtered.				6	0	6	150	4	27·10	2·7
Naini Tal ..					4	0	4	117	13	63·22	11·9
Dehra Dun ..					12	1	13	134	56	83·31	41·8
Jhansi ..	..				0	1	1	14	11	In-numerable.	78·60
Mirzapur ..	Gravitation supply.				2	0	2	74	12	42·00	16·5
Muttra ..	Tube well supply.				3*	0	3	105	8	23·70	7·6
Fyzabad ..					2	2	4	292	0	14·40	0·0
Hardwar ..					11	0	11	204	20	38·70	9·8
Unao					3	0	3	85	6	68·64	18·0
Kosi					1	0	1	22	2	10·35	9·1
Fatehpur-Sikri ..					No test done.						
Aligarh ..					4	1	5	80	5	24·40	6·3

* High Chlorine figures.

† Paterson filters.

APPENDIX No. V.

Details of pumps, filters, tanks, reservoirs, rising mains, etc., in the water-works of the United Provinces for 1931-32.

Omitted, *vide* Municipal department G. O. No. 106/XI—27 S. E., dated January 9, 1932.

APPENDIX No. VI.

Detailed estimate of expenditure incurred on Health works under supervision of the Superintending Engineer, Public Health department, during the year 1931-32.

Serial number.	Name of places.	Water-works original and special repairs.	Water-works maintenance.	Drainage works.	Other works.	Total.
		Rs.	Rs.	Rs.	Rs.	Rs.
1	Agra	31,137	1,68,940	7,725	13,117	2,20,919
2	Aligarh	17,986	17,967	3,481	2,260	41,694
3	Allahabad	51,734	2,25,333	10,444	4,039	2,91,550
4	Allahabad Magh Mela	..	14,299	..	10,244*	24,543
5	Almora	26,738	..	1,539	1,858	30,135
6	Amroha	..	..	289	..	289
7	Azamgarh	..	..	129	2,452	2,581
8	Ballia..	555	..	468	..	1,023
9	Baraut	..	..	381	..	381
10	Banbhulpura (Haldwani)	..	..	5,911	..	5,911
11	Banda	..	..	489	10,050	10,539
12	Bareilly	..	..	..	2,407†	2,407
13	Bela (Partabgarh)	87	..	340	26	453
14	Benares	7,896	2,31,467	47,247	6,136	2,92,746
15	Bhimtal	16,758	..	..	..	16,758
16	Bijnor	1,452	..	128	2,830	4,410
17	Brindaban	4,232	..	693	578 5,614‡	11,117
18	Budaun	419	..	29,645	270	30,328
19	Bulandshahr	..	..	2,111	280	2,391
20	Cawnpore	37,055	3,08,931	1,47,859	2,24,058	7,17,903
21	Chandpur	147	..	316	..	463
22	Chirgaon	..	..	4,631	..	4,631
23	Danyalpur (Sitapur)	..	..	1,875	..	1,875
24	Dehra Dun	..	10,186	2,010	344 30,136§	42,676
25	Dewa (Bara Banki)	3,428	..	..	..	3,428
26	Etah	198	..	1,883	987	2,068
27	Etawah	2,383	..	476	19,930	22,789
28	Farrukhabad	..	..	771	..	771
29	Fatehpur	117	..	89	..	206
30	Fatehpur-Sikri	6,673	3,151	..	..	9,824
31	Fyzabad	36,663	31,846	950	..	69,459
32	Gaurfa (Sitapur)..	..	..	1,165	..	1,165
33	Gond Nadi (Sitapur and Kheri) ..	..	..	417	..	417
34	Ghaziabad	57	..	2,434	243	2,734
35	Ghazipur	65	..	416	664	1,145
36	Gonda	..	..	3,027	..	3,027
	Carried over ..	2,45,774	10,12,120	2,79,339	3,38,523	18,75,756

* Electric supply.
† Anti-malarial works.
‡ River training.
§ Infectious Diseases Hospital.

APPENDIX No. VI—(*continued*).

Detailed estimate of expenditure incurred on health works under supervision of the Superintending Engineer, Public Health department, during the year 1931-32.

Serial number.	Name of places.	Water-works original and special repairs.	Water-works maintenance.	Drainage works.	Other works.	Total.
		Rs.	Rs.	Rs.	Rs.	Rs.
	Brought forward ..	2,45,774	10,12,130	2,79,339	3,38,523	18,75,756
37	Gola Tank (Kheri)	..	..	11,859	..	11,859
38	Gorakhpur	525	..	2,233	6,683	9,444
39	Haldwani	483	..	851	653	1,987
40	Hardoi	..	..	289	4,797	5,086
41	Hardwar	8,255	21,398	192	464	30,239
42	Hathras	21,835	..	838	..	22,673
43	Jaunpur	..	..	2,172	1,170	3,342
44	Jhansi	7,278	14,495	..	..	21,773
45	Kachnari (Bareilly)	..	..	122	..	122
46	Kaimganj	..	..	5,014	..	5,014
47	Kairana	..	..	..	1,639	1,639
48	Kannauj	936	..	742	..	1,678
49	Kasganj	..	..	697	2,203	2,900
50	Khurja	1,047	..	..	*4,104	5,151
51	Kosi	73	4,840	..	6,626	11,539
52	Kotwa (Bara Banki)	..	..	17,719	..	17,719
53	Lakhimpur	..	..	3,629	971	4,600
54	Lalitpur	33	..	134	242	409
55	Lucknow	53,360	2,30,739	30,249	5,090 †9,680	3,79,118
56	Meerut	1,450	37,897	7,087	1,694	48,128
57	Mirzapur	653	4,576	850	262	6,341
58	Moradabad	500	..	1,959	3,462	5,921
59	Mugal Sarai	..	..	1,593	..	1,593
60	Mussoorie	5,351	84,003	4,638	2,844	96,836
61	Muttra	8,074	64,062	858 ‡8,914	8,578	80,486
62	Muttra Banjabra..	7,372	..	..	..	7,372
63	Muzaffarnagar	753	..	2,350	1,367	4,470
64	Naginа	597	..	4,451	..	5,048
65	Naini Tal	2,736	59,976	4,778	2,363	69,853
66	Nawabganj	..	..	805	210	1,015
67	Orai	252	..	433	1,293	1,978
68	Pilibhit	..	..	108	1,362	1,470
69	Piran Kaliar (Saharanpur).. ..	9,688	..	..	..	9,688
	Carried over ..	3,76,975	15,84,096	3,89,233	4,01,285	27,51,594

* Electric supply.
† Anti-malarial works.
‡ Sewage farm.

APPENDIX No. VI—(*concluded*).

Detailed estimate of expenditure incurred on health works under supervision of the Superintending Engineer, Public Health department, during the year 1931-32.

Serial number.	Name of places.	Water-works original and special repairs.	Water-works maintenance.	Drainage works.	Other works.	Total.
		Rs.	Rs.	Rs.	Rs.	Rs.
	Brought forward ..	3,76,975	15,84,096	3,89,238	4,01,285	27,51,594
70	Pandohi Nadi	..	..	1,500	..	1,500
71	Rae Bareli	142	..	185	103	430
72	Rikhikosh	..	..	..	29,746*	29,746
73	Roorkee	..	..	1,632	5,248	6,880
74	Saharanpur	..	..	7,275	7,917	15,192
75	Sahaswan	294	..	1,099	2,385	3,778
76	Sambhal	..	..	421	314	735
77	Sandila	233	..	1,106	272	1,611
78	Sarain (Kheri)	..	..	350	..	350
79	Seothan (Sitapur)	..	..	1,415	..	1,415
80	Sikandrabad	..	..	153	..	153
81	Sikandra Rao	..	..	641	..	641
82	Sitapur	117	..	1,824	62	2,003
83	Shahjahanpur	..	..	181	3,630	3,811
84	Sultanpur	244	..	457	732	1,433
85	Tilhar..	164	..	368	..	532
86	Ujhani	..	..	275	..	275
87	Unao	41,884	7,183	1,137	1,201	50,905
	Total ..	4,19,553	15,91,279	4,09,257	4,52,895	28,72,984

* Infectious Diseases Hospital.

APPENDIX No. VII.

Comparative statement of fuel consumption, working expenses and receipts of various water-works in the United Provinces during the year 1931-32.

Omitted, *vide* Municipal department G. O. no. 106/XI—27-S.E., dated January 9, 1932.

APPENDIX No. VIII.

Statement showing initial capital cost, details of income and expenditure for water-works in the United Provinces for the year 1931-32.

Omitted, *vide* Municipal department G. O. no. 106/XI—21-S.E., dated January 9, 1932.

APPENDIX No. IX.

HYDRO-ELECTRIC SUPPLY.

1931-32.

Particular.	Mussoorie.	Naini Tal.
1. Total units generated	3,555,931	1,168,644
2. Maximum units for any one day	12,938	4,678
3. Average load K. W.	353	163·62
4. Power Factor—		
Maximum	0·95	0·99
Minimum	0·75	0·25
5. Load Factor—		
Maximum (monthly)		
Average	0·45	0·45
Minimum (monthly)		
6. Generating Volts—		
Maximum	7,000	3,500
Minimum	6,600	3,500
7. Total hours of running	10,806·72	8,780·75
8. Total cubic feet of water used	193,868,760	40,195,700
9. Maximum quantity used in any month, cubic feet	20,012,880	3,867,600
10. Minimum quantity used in any month, cubic feet	10,281,180	3,064,480
11. Average rate of discharge, cubic feet per diem	673,920	109,824
12. Maximum rate of discharge of pipe line—		
No. 1, cubic feet per second	8·30	Both lines worked together.
No. 2, cubic feet per second	8·30	
13. Minimum rate of discharge of pipe line—		
No. 1, cubic feet per second	7·30	
No. 2, cubic feet per second	7·30	
14. Average intake level		8·35
15. Maximum intake level	4,491	12·00
16. Minimum intake level		4·70
17. Total rainfall for the year, inches	98·20	75·09
18. Total cubic feet overflow intake weir (million cubic feet) (Naini Tal only).	..	19·93
19. Maximum recorded rainfall for 24 hours, inches	5·80	3·89

APPENDIX No. IX(A).

ELECTRIC SUPPLY.

1931-32.

Particulars.	Hardwar.
1. Total units received	359,894
2. Maximum units for any one day	1,100
3. Average load K. W.	50
4. Power Factor—	
Maximum	0·85
Minimum	0·80
5. Load Factor—	
Maximum (monthly)	..
Average	..
Minimum (monthly)	..
6. Receiving Volts—	
Maximum	410
Minimum	400

APPENDIX No. X.

Statement showing current consumed, rate charged and revenue derived.

1931-32.

Particulars.	Mussoorie.			Naini Tal.			Hardwar.		
	Units.	Rate.	Rs.	Units.	Rate.	Rs.	Units.	Rate.	Rs.
1. For Municipal purposes—									
Public lighting ..	185,234	Two annas ..	23,301	135,140	Lump sum ..	21,000	59,726	Three annas and seven pies.	14,952
	(a) 180,383	Contract rate ..	25,004						
W. S. Pumping ..	756,933	One anna ..	47,308	204,283	Three annas ..	38,303	99,186	Two annas ..	12,199
Other purposes ..	297,416	..	18,591	(y) 32,987	..	8,230	2,052	Three annas and seven pies.	425
2. Sold by meter—									
Lighting	274,232	Six annas ..	1,02,837	270,159	Eight annas ..	80,453	*44,100	Six annas ..	18,182
	(a) 391,544		1,46,829				†41,884	Four annas ..	11,407
Heating	105,554	One anna ..	6,597	118,119	One anna four pies ..	7,373	..	..	..
Power	(a) 148,688		34,293	3,511	Two annas eight pies.	459	93,773	One anna and six pies	9,427
3. Recoveries on rated premises—	Included in	lighting item 2. ..	..	30,916	Rupees two per mensem per lamp.	7,605	12,280	..	4,227
4. Other receipts ..	..	..	1,158	829	..	5,777	..	..	943
5. Meter rent and miscellaneous.	..	..	6,607	..	..	11,643	..	..	1,606
			(a) 11,459						
6. Total units sold and receipts.	(b) 2,740,024	..	4,24,584	(c) 800,984	..	1,80,842	353,001	..	73,368

(a) For Dehra Dun.
(b) Does not include 815,897 units losses in transmission, etc.

(y) Includes 10,087 units for lake pump house.
(z) Does not include 87,081 units free supply.

* Private.
† Railway.

APPENDIX No. XI.

Statement showing number of connexions.

1931-32.

Particulars.	Mussoorie.		Naini Tal.		Hardwar.	
	Number.	K. W.	Number.	K. W.	Number.	K. W.
1. Private connexions at close of preceding year.	2,082 *2,783	..	1,494	..	500	..
2. Connexions made during the year	141 *146	..	112	..	49	..
3. Motored connexions existing on March 31, 1932.	1,134 *1,481	..	856	..	297	..
4. Municipal lamps existing on March 31, 1932.	863 *938	..	593	..	537	..
5. Heating points connected on March 31, 1932.	387 *215	..	234	..	..	..
6. Total K. W. connected on March 31, 1932.	..	4,280	..	1,086·90	..	339
7. Peak load for the year ..	..	H.E. 825 Diesel 540	..	340	..	112
8. Diversity factor per cent. ..	..	45 %	..	20·15 %	..	..

* Connexions for Dehra Dun.

APPENDIX No. XII.

HYDRO-ELECTRIC SUPPLY.

Annual maintenance account.

1931-32.

Particulars of charges.	Mussoorie.	Naini Tal.
	Rs.	Rs.
I.—Staff charges—		
(*a*) Direction	23,425	7,435
(*b*) Office establishment	17,306	13,097
(*c*) Power station staff	23,996	3,516
(*d*) Sub-station staff	6,139	1,941
(*e*) Pipe line staff	..	1,115
(*f*) Overhead line staff	16,536	5,015
(*g*) Auxiliary pump	..	297
(*h*) Contingencies	..	3,367
II.—Materials—		
(*a*) Oils		
(*b*) Lubricants		
(*c*) Waste	21,085	1,612
(*d*) Buildings		
III.—Repairs—		
(*a*) Machinery	1,951	1,919
(*b*) Pipe line	11,278	100
(*c*) Overhead line	16,077	7,263
(*d*) Buildings	7,009	97
IV.—Rents	2,447	..
V.—Printing	1,847	97
VI.—Stationery	1,951	500
VII.—Insurance	17,674	257
VIII.—Total maintenance charges	1,67,671	46,277
IX.—Interest and sinking fund charges	1,82,846	1,42,818
X.—Total annual charges	3,50,517	1,89,095
XI.—Total units generated	3,555,921	1,168,644
XII.—Total units sold	2,740,024	800,984
XIII.—Cost per unit generated Annas	1·53	2·59
XIV.—Cost per unit sold Annas	2·05	3·78

APPENDIX No. XII-A.

ELECTRIC SUPPLY.

Annual maintenance account.

1931-32.

Particulars of charges.	Hardwar.
I.—Staff charges—	Rs.
(a) Direction	3,432
(b) Office establishment	1,590
(c) Sub-station staff	1,540
(d) Overhead line staff	2,879
(e) Contingencies	..
II.—*Cost of electric energy purchased during the year from Irrigation department.*	39,543
III.—Materials—	
(a) Oils	..
(b) Lubricants	..
(c) Waste	..
(d) Buildings	..
IV.—Repairs—	
(a) Machinery	..
(b) Overhead line including cost of bulbs	1,984
(c) Buildings	301
V.—Rents	60
VI.—Printing	295
VII.—Stationery	142
VIII.—Insurance	..
IX.—Miscellaneous— (a) Service	1,315
(b) Capital outlay	902
X.—Total maintenance charges	53,923
XI.—Interest and sinking fund charges	14,752
XII.—Total annual charges	68,675
XIII.—Total receipts during the year	73,368
XIV.—Total units purchased	359,894
XV.—Total units sold	352,001
XVI.—Profit during the year	4,693
XVII.—Total loss in transformer and transmission, etc.	6,893
XVIII.—Cost per unit purchased .. .. annas	3·05
XIX.—Cost per unit sold .. .. "	3·11

APPENDIX No. XIII.

A.—List of projects finally sanctioned during the year 1931-32.

I.—Provincial.

(*a*) *Fair projects*—

		Rs.
1.	Allahabad Magh Mela water supply and maintenance, 1931-33	14,040
2.	Allahabad Magh Mela water supply and maintenance ..	1,179
3.	Allahabad Magh Mela electrification	10,816
4.	Lucknow Ghaziuddin Hyder Canal maintenance, 1931-33 ..	8,000
		34,035

(*b*) *Preliminary proposals*—

Nil.

(*c*) *Forecast of cost*—

Nil.

II.—Deposit works.

(*a*) *Fair projects*—

1.	Budaun drainage (revised)	39,369
2.	Dehra Dun water supply, water softening and chlorinating plant supplementary estimate.	81,009
3.	Fyzabad water supply extension (supplementary) ..	5,173
4.	Ghaziabad elevated tank, capacity 12,000 gallons ..	5,916
5.	Hardwar improvement to Har-ki-pairi	1,95,523
6.	Meghalsarai drainage	33,405
7.	Moradabad flushing scheme, installation of electro-motor ..	3,601
8.	Muttra sewage disposal, providing brick lining to the kutcha distribution channel.	7,199
9.	Unao water supply (supplementary)	6,227
10.	Unao water supply tube-well no. 3 (2nd revised estimate) ..	18,983
		4,41,009

(*b*) *Preliminary proposals*—

1.	Cawnpore drainage, part VI..	2,25,000
		2,25,000

(*c*) *Forecasts of cost.*—

1.	Agra Dayalbagh drainage	1,55,400
2.	Dehra Dun water supply Banjarawala spring I Alternative ..	3,23,000*
	Ditto ditto II ditto ..	3,73,873*
	Ditto ditto III ditto ..	4,10,000
3.	Dehra Dun water supply preliminary proposal	11,700
4.	Fatehpur-Sikri water supply providing standposts ..	4,000
5.	Gola Gokran Nath back blowing and test pumping of tube-well	2,500
6.	Hardwar Bhopatwala town planning	9,12,000
		14,95,600

B.—List of projects submitted but not sanctioned during the year 1931-32.

I.—Provincial.

(*a*) *Fair projects*—

		Rs.
1.	Fatehgarh new police lines tube-well	3,188
2.	Lucknow King George's Hospital, nurses house sanitary fittings.	21,316
3.	Meerut Central Jail drainage (revised)	2,15,139
4.	Meerut Central Jail water supply	2,15,995
5.	Pilibhit district Jail tube-well	5,723
		4,60,356

(*b*) *Preliminary proposal*—

Nil.

(*c*) *Forecast of cost*—

	Cawnpore cantonments tube-well in Wheeler's entrenchment ..	92,000
		92,000

II.—Deposit works.

(*a*) *Fair projects*—

1.	Aligarh water supply additional tube-wells and pumping plant.	1,53,421
2.	Aligarh water supply tube-wells	62,671
3.	Almora water supply maintenance for two months ..	420
4.	Brindaban water supply tube-wells	48,869
5.	Budaun drainage extension	45,740
6.	Ghazipur water supply trial tube-well..	19,770
7.	Hardwar additions to infectious diseases hospital ..	24,900
8.	Unao water supply increasing the capacity of balancing tank	1,473
		3,57,364

(*b*) *Preliminary proposal*—

1.	Cawnpore Partmat sewage pumping station reorganization	2,08,700
		2,08,700

APPENDIX No. XIII—(*concluded*).

(*c*) *Forecasts of cost*—

		Rs.
1.	Agra water supply, providing boosting pumps for cantonments water supply improvements.	23,000
2.	Aligarh water supply improvements for comparison of cost from canal and tube-wells. 1st alternative	10,00,000
	2nd "	4,50,000*
	3rd "	1,70,000*
3.	Allahabad drainage pumping station repairs to old pipes ..	1,002
4.	Cawnpore Improvement Trust Kalpi Road tube-well	14,000
5.	Dehra Dun Muttrawala test pumping of a percolation well ..	2,750
		10,40,752

C.—List of projects under preparation with approximate estimated amount.

I.—Provincial Works.

(*a*) *Fair projects*—

1.	Allahabad Magh Mela water supply and maintenance, 1932-33 ..	13,905
2.	Cawnpore Industrial school drainage	20,000
		33,905

(*b*) *Preliminary proposal*—

Nil.

(*c*) *Forecasts of cost*—

1.	Allahabad Magh Mela water supply installation of 2nd pumping plant	30,000
2.	Allahabad Magh Mela tube-well no. 2	700*
		30,000

II.—Deposit Works.

(*a*) *Fair projects*—

1.	Agra Dayalbagh drainage	1,75,000
2.	Banbhulpura (Haldwani) drainage (revised)	42,120
3.	Bareilly Anti-Malarial drainage (revised)	18,000
4.	Cawnpore drainage, part VI	2,25,000
5.	Cawnpore sewage disposal	6,72,000
6.	Fatehpur-Sikri (Agra) water supply providing extra standposts ..	4,000
7.	Jaunpur water supply, first instalment	1,29,000*
	Ditto comprehensive	3,50,000
8.	Sandila meat market	9,685
9.	Type design of a tanning godown	25,000
		15,26,805

(*b*) *Preliminary proposal*—

Nil.

(*c*) *Forecasts of cost*—

1.	Haldwani water supply purification	15,000
2.	Puranpur (Pilibhit) drainage	50,000
3.	Ranibagh (Kathgodam) water supply	10,000
		75,000

D.—List of works delayed for want of staff.

Projects—

1. Agra drainage, first instalment.
2. Agra Pressure survey of the pipe lines.
3. Brindaban water supply.
4. Cawnpore drainage, part VI.
5. Meerut drainage, first instalment.
6. Type design of a tanning godown.

Completion drawings and reports—

1. Kaimganj drainage.

APPENDIX No. XIV.

Revenue derived from sewage farms during the year 1931-32.

Sl. no.	Particulars.	Agra.	Allahabad.	Dehra Dun.	Lucknow.	Muttra.
1	Area under cultivation, in acres ..	64·9	240	4·19	(1) 685·68	55·18
2	Total rent realized from cultivators. Rs.	12,480	(3) 23,325	344	(2) 9,675	5,856
3	Average rent per acre per annum. Rs.	192	97·19	82·10	40·77	106·12
4	Quantity of sewage treated in million gallons.	Not available.	(4) 607·23	1·23	Not supplied for want of meter.	(5)80·26
5	Average quantity of sewage consumed per acre per diem in gallons.		6,913	800		3,674
6	Expenditure incurred on the maintenance of the farms. Rs.	4,703	10,545	Nil.	3,087	1,349
7	Revenue derived. Rs. ..	12,480	(6) 12,996	344	9,675	5,856
8	Profit .. ,, ..	7,877	2,451	344	6,588	4,507
9	Loss .. ,, ..	Nil.	Nil.	Nil.	Nil.	Nil.

(1) Only 178 acres were treated with sewage.
(2) Only Rs. 7,257 were realized as rent from the area supplied with sewage.
(3) This amount does not include Rs. 3,247 representing cost of sewage sold to the Agricultural Institute.
(4) This figure does not include 182·50 million gallons sewage sold to Agricultural Institute.
(5) Out of total quantity of 81·52 million gallons of sewage pumped only 80·26 million gallons were treated on the sewage farm.
(6) Includes Rs. 8,000 cost of sewage realized from the Agricultural Institute.

APPENDIX No. XV.

Statement of expenditure on construction works carried out by the Engineering branch of the Public Health department during 1931-32.

Serial number.	Name of works.	Estimated cost.	Total expenditure up to the end of March, 1931.	Expenditure incurred during the year.
	I.—Provincial.	Rs.	Rs.	Rs.
1	Allahabad Magh Mela water supply and maintenance for 1931-1932.	14,040	..	13,432
2	Allahabad Magh Mela electrification	10,846	..	10,244
3	Allahabad Magh Mela water supply maintenance ..	1,179	..	867
4	Dewa Fair (Bara Banki) water supply	57,859	..	3,428
5	Etawah Kutchery 5' masonry well	3,736	1,129	2,383
6	Lucknow Anti-malarial and drainage works, Ghazi-uddin Hyder Canal, Maintenance.	14,000	..	9,680
7	Piran Kaliar (Roorkee) water supply	39,837	15,422	9,506
8	Piran Kallar water supply	9,513	8,255	132
	Total	..	..	49,672
	II.—Deposit Works.			
1	Agra water supply extension to raw water pumping plant.	90,557	75,848	6,931
2	Agra New Mechanical Filtration plant	2,84,250	1,99,047	6,025
3	Ajodhya (Fyzabad) water supply..	37,112	14,120	..
4	Aligarh water supply	5,63,245	4,52,826	8,503
5	Allahabad Civil Lines 2 tube-wells	41,133	1,020	..
6	Almora water supply	1,75,342	1,46,919	26,788
7	Banbhulpura (Haldwani) drainage	42,120	500	5,911
8	Bareilly Anti-malarial work outfall	18,347	319	2,407
9	Brindaban (Muttra) water supply 3rd Trial bore and 4th tube-well.	7,901	2,921	4,232
10	Benares water supply extension	5,12,255	5,05,586	..
11	Bhim Tal water supply, Section I	6,400	5,870	529
12	Bhim Tal water supply, Section II	16,797	175	16,229
13	Brindaban Infectious Diseases Hospital	44,036	1,070	..
14	Budaun drainage	89,369	55,230	29,645
15	Chirgaon (Jhansi) drainage improvements	34,388	30,047	4,631
16	Dehra Dun Infectious Diseases Hospital	46,621	..	30,133
17	Dehra Dun water supply, water softening and chlorinating plant (original and supplementary estimates).	81,609	*53,603	..
18	Fatehpur-Sikri water supply	48,976	44,136	58
19	Fatehpur-Sikri Mela water supply	14,800	..	6,673
20	Fyzabad water supply Extension	50,036	37	28,771
21	Haldwani water supply improvement, 4" main ..	5,943	5,900	..
22	Hathras tube-wells nos. 3, 4 and 5	34,800	11,414	21,885
23	Kaimganj drainage	60,415	52,931	5,014
24	Kanauj Drainage block E	15,097	..	742
25	Khurja water supply tube-well	20,535	19,214	1,047
26	Khurja electric supply	1,86,234	1,48,530	4,104
27	Kosi water supply	1,02,182	70,332	..
28	Lucknow water supply additional mechanical filtration and sterilization plant.	3,28,358	3,05,311	100
29	Meghal Sarai drainage	32,405	..	1,593
30	Moradabad flushing installation of electromotor ..	8,601	..	500
31	Muttra-Banjatra route water supply (wells at Jamalpur and Tulban).	7,372	..	4,765
32	Muttra laying sewage farm and irrigation guls ..	7,922	6,585	503
33	Muttra sewage disposal, providing brick lining to the kutcha distributing channel.	7,199	..	3,411
34	Muttra water supply additional tube-well no. 5 ..	55,311	18,165	3,989
35	Muttra water supply masonry well	26,984	13,537	..
36	Muzaffarnagar New Mandi drainage	4,68,447	1,01,070	44,151
37	Rikhikesh Infectious Diseases Hospital	33,089	1,625	29,746
38	Unao additional pumping plant extension	37,636	982	25,338
39	Unao drainage	1,80,316	6,472	..
40	Unao water supply additional tube-well extension ..	16,982	6,412	7,038
				3,81,243

*Out of this amount a sum of Rs. 7,681 has been debited to the contractor's account owing to the removal of softening plant.

APPENDIX No. XVI.

Establishment percentages, Superintending Engineer's Branch, Quinquennium 1925-26 to 1929-30.

Particulars of works.	Estimated amount.	Actual expenditure incurred by P. H. D. Divisions on preparation of projects or supervision of construction.	Superintending Engineer's Establishment.	Water Works Engineer and Mechanical Advisor's Establishment.	Total of columns 3, 4 and 5.	Percentage of columns 6 to 2.	Percentage charges according to G. O. no. 2980/XI—64, dated September 19, 1931.			Total of column 8.	Percentage of columns 9 to 2.
							75 per cent. of column 3.	25 per cent. of column 4.	Nil percentage of column 5.		
1	2	3	4	5	6	7	8			9	10
	Rs.	Rs.	Rs.	Rs.	Rs.		Rs.	Rs.	Rs.	Rs.	
1. *Project prepared for—*											
(a) Local bodies	1,00,61,167	3,99,100	1,48,464	66,638	6,14,201	3·82	2,99,325	37,116	..	3,36,441	2·09
(b) Local Government, (i) P. W. D. ..	5,78,973	13,610	5,062	2,270	20,942	3·62	10,207	1,266	..	11,473	2·00
(ii) Other Remittance works ..	25,54,549	40,177	14,945	6,708	61,831	2·42	30,123	3,732	..	33,869	1·33
2. Forecast of costs—											
(a) Local bodies	1,93,64,499	1,69,424	61,909	27,788	2,56,121	1·32	1,24,813	15,477	..	1,40,295	0·72
(b) Local Government, (i) P. W. D. ..	68,875	139	52	23	214	0·31	104	13	..	117	0·17
(ii) Other Remittance works ..	3,04,224	2,255	823	378	3,466	1·14	1,692	209	..	1,901	0·62
3. Construction works carried out for—											
(a) Local bodies	86,51,970	4,13,672	1,53,885	69,061	6,36,618	7·36	3,10,254	38,471	..	3,48,725	4·03
(b) Local Government, (i) P. W. D. ..	1,35,964	5,333	2,035	933	8,369	6·33	4,227	524	..	4,751	3·49
(ii) Other Remittance works ..	9,33,492	33,044	36,391	13,881	1,27,316	13·00	62,283	7,723	..	70,006	7·12
Total ..	..	11,24,057	4,18,141	1,37,861	17,29,879	..	8,43,048	1,04,535	..	9,47,578	..

Municipal Property

THIRTY-SIXTH ANNUAL REPORT

OF THE

SUPERINTENDING ENGINEER

PUBLIC HEALTH DEPARTMENT
UNITED PROVINCES

FOR THE YEAR ENDED MARCH 31, 1931

ALLAHABAD:
THE SUPERINTENDENT, GOVERNMENT PRESS, UNITED PROVINCES
1931

From

G.McC. Hoey, Esq.,
Superintending Engineer,
Public Health Department,
United Provinces.

To

The Chairman
Municipal Board
Nainital

Submitted
16/X/31

XIII
14
1
1556

No. 6467/M-29. Dated Lucknow, October 13, 1931.

Subject:- ANNUAL REPORT.

Sir,

I have the honour to forward for information a copy of my Annual Report for the year ended March 31, 1931.

I have the honour to be,
Sir,
Your most obedient servant,

Submitted to Chairman for perusal.
Secretary
16/10/31

13.10.31
For Superintending Engineer,
Public Health Department,
United Provinces.
13/X

Encl:-

VNB

THIRTY-SIXTH ANNUAL REPORT

OF THE

SUPERINTENDING ENGINEER

PUBLIC HEALTH DEPARTMENT
UNITED PROVINCES

FOR THE YEAR ENDED MARCH 31, 1931

ALLAHABAD:
THE SUPERINTENDENT, GOVERNMENT PRESS, UNITED PROVINCES
1931

Thirty-sixth Annual Report of the Superintending Engineer, Public Health department, United Provinces, for the year ended March 31, 1931.

The extent of the work undertaken by this department during the year under review may be judged from the following statements:—

Item no.	Nature of work.	Amount involved in lakhs of rupees.	Remarks.
1	Duties under the Local Authorities Loans Act, 1914, and the Municipalities Act, 1916, i.e., the supervision and inspection of all open water works and drainage pumping stations.	61·15	This amount represents the turn-over in revenue and expenditure on water supply, drainage and electricity supply and is made up as follows:—

	Revenue.	Expenditure.	Total.
	Rs.	Rs.	Rs.
Water supply	25,25,076	21,85,575	47,10,651
Drainage ..	46,993	69,577	1,16,570
Electric supply.	6,75,361	6,12,502	12,87,863
GRAND TOTAL	32,47,430	28,67,654	61,15,084

Item no.	Nature of work.	Amount involved in lakhs of rupees.	Remarks.
2	Local works:—		
	(a) Preparation of projects ..	42·26	Includes 34 detailed proposals and four preliminary estimates.
	(b) Construction	7·55	Payments made.
3	Provincial Works—		
	(a) Preparation of projects ..	8·22	26 Detailed projects.
	(b) Construction	1·15	Payments made.
	(c) Maintenance	0·13	Lucknow Anti-malarial and Allahabad Magh Mela water-supply maintenance.
4	(a) Advice free to local authorities ..	13·19	Seventeen forecasts of cost with reports were supplied free.
	(b) Advice free for Provincial Works ..	1·14	Nine forecasts of cost and reports were supplied free.
5	Board of Public Health business:—		
	(a) Examination of projects for urban works.	4·37	Five projects were scrutinised.
	(b) Examination of projects for rural sanitation.	1·88	Three hundred and thirty-five projects were examined.
	(c) Checking progress on urban and rural areas, G. O's nos. 468/XI, dated February 6, 1931, 470/XI, dated February 6, 1931, 580/XI, dated February 11, 1931, 488/IX, dated April 9, 1931 and 490/IX, dated April 9, 1931.	7·91	Progress reports of divisions were collected and consolidated statements submitted to the Board of Public Health.
6	Examination of projects for provincial works.	4·79	Four projects were examined.
7	Inspection and reports on works carried out by local authorities themselves.	6·62	Works estimated to cost about Rs. 10·36 lakhs were undertaken by the local authorities themselves on which advice was sought.

The total of projects including preliminary proposals and forecasts of cost which have been prepared during the year amounts to Rs. 64·81 lakhs, while the construction work carried out amounts in value to Rs. 8·70 lakhs.

Of the above seven items, fees are recoverable only on item 2, and during the year an amount of Rs. 21,293 was earned as fees on projects completed, against an amount of Rs. 11,370 realised. Including the arrears of the previous year, a sum of Rs. 26,725 was realised as fees for the preparation of projects. Earnings for construction, carried out by this department amounted to Rs. 86,778. Thus for local works a total sum of Rs. 1,03,502 was realised against Rs. 90,000 anticipated as recoveries in this year's budget.

The departmental scale of fees chargeable to Municipal Boards for the preparation of projects and supervision of works, has, during the year, also been made applicable to District Boards, Notified Area Committees and Town Areas; the question of fees to be charged for work done for the Public Works Department, Buildings and Roads Branch and other departments is still under the consideration of Government. This matter was the subject of inquiry during the year by a committee.

If fees were leviable on provincial works also, on the same scale as on local works, a sum of Rs. 30,217 would have been credited in addition to the earnings of Rs. 1,03,502 above mentioned.

The duties which are enumerated in the table under item (2) which absorb the energies of an appreciable amount of the staff of this department are not those which should rightly be shouldered by Government; the system is forced upon the administration owing to the inability of local authorities to employ proper technical staff. With a very few creditable exceptions the estimates which are received from local authorities are of such unsatisfactory nature and so wanting in essential information that they cannot be subscribed to by the inspecting officers. Until the local authorities realise that a certain amount of experience and technical skill is required on the part of their staff, there is no hope of any improvement in this state of affairs.

The department on the whole has had a busy year and there remains a considerable list of works, mainly projects, waiting to be taken up by the three divisions when staff is available. Some arrears also await completion, such as completion plans and reports, the preparation of which has not been possible for the last two years due to pressure of work.

The amount of project work which is undertaken on behalf of local authorities is vast, when the funds which are made available for carrying out the projects are considered. There is a long list of works urgently necessary concerning which funds cannot be provided, within a reasonable time. In this category drainage works are numerous and two works of outstanding necessity, namely, the reconstruction of Lucknow main sewers and the Agra drainage work, are long overdue.

The manner in which local authorities maintain their works has received unfavourable comment in previous reports. Except in one or two instances no improvement can be recorded during the year, and a general deterioration is noticeable rather than an improvement.

Cases have occurred during the year in which the recommendation with regard to the placing of contracts have not been accepted by the local authorities concerned. Some local authorities refuse to acknowledge that water-supply and drainage work entail some experience on the part of the contractors employed, if the works are to prove a success. Inexperienced contractors who are willing to undertake work at unreasonably low rates almost always attempt to evade their responsibilities. The work is in this way delayed, the cost of supervision is increased and inferior work cannot be always avoided. The question of maintaining a list of approved contractors possessing the necessary skill and experience whose tenders only should be considered for such works is under consideration.

The operations involving preparation of estimates, letting contracts and carrying out construction require more serious attention if the rate-payers money is to be spent to the best advantage. A further elaboration of rules was ordered in G. O. no. 1015/XI—91, of April 3, 1930, laying down the procedure which must be followed in letting contracts, as a result of numerous irregularities.

Many of the local authorities seem unable to obtain the services of competent staff or when they do succeed in making an appointment, they fail to hold staff in employment. There is an unhappy custom prevalent; the members of boards interfere in details and undermine the authority of their staff. In this manner it is impossible to fix responsibility for defects and the public interests are badly served. This feature of municipal administration is evident from the frequency with which the rules for appointment of staff are broken or evaded and the dilatory way in which correspondence is dealt with.

A reluctance has been noticed on the part of several boards to take loans for renewals of their plant or for works which are really of capital nature such as extensions of a water supply and the purchase of meters. Since the life of such works is at a minimum ten years duration and in many cases is over thirty years, the inclusion

of its cost under the annual maintenance charges is inadvisable on several grounds; it saddles the present tax-payers with an expenditure which should be shared by future generations; it has a still more serious result in obscuring profits and in leading the local authorities to believe that their operations are being carried out at a loss.

The water supplies and other public works of many of the large municipalities involve large sums of recurrent expenditure and many of the activities also earn revenue on a large scale. Specialised administration of such departments is of importance and the persons chosen to administer these departments should possess such experience and training as to render them capable of inspiring confidence and guiding the policies of local authorities by reason of their permanent positions as trustworthy servants. A local authority working loyally under wise leadership should encounter no difficulty in securing the services of permanent officials of high enough attainments for such posts; such men are the only means by which a local authority can make progress.

WATER SUPPLY—GENERAL.

The consumption of water in practically all the larger towns shows a tendency to increase by leaps and bounds and some of the systems which were already reorganised and extended a few years ago are now working far above their designed capacity. With one or two exceptions no local authority has the courage to undertake steps necessary to control its distribution and restrict waste to within reasonable dimensions. The result in many places is that great discontent is caused by scarcity in supply when the hot weather begins. On the resulting clamour, urgent demands are made by the local authority for extensions to their plant. In the majority of cases where the supply is showing a small profit the surplus is swallowed up under other heads of expenditure by the local authority. The general impression seems to be that Government should assist by means of grants-in-aid to meet the ever-growing demand for water, although the boards persist in neglect to curb waste.

Instances have occurred where works undertaken by this department on behalf of local authorities, have been satisfactorily completed and tested, but the plant has been subsequently neglected, and demands made on Government on grounds that the work was inadequate and ill suited to the purpose required. One remarkable instance took place where certain plant was taken over by a company from a municipal board which has neglected it to such extent that a complete breakdown was imminent. The board left no stone unturned to discredit the work and to use the circumstances brought about by deliberate neglect as a means of forcing further assistance from Government. It was discovered by independent authority that the plant was capable of considerable more output than that declared by the official tests when the defects brought about by neglect had been attended to. Such conduct on the part of a local authority renders the carrying out of works by this department on their behalf, unworkable.

The inequalities in supply which take place in many of the large municipalities remain more marked than ever in spite of additional plant. This is due to neglect to control the distribution and to apply meters in those areas where the pressure is high and the supply continuous. Outlying areas are those usually favoured for desultory metering though the supply there is intermittent and scant. Except in the case of Cawnpore none of the plains municipalities dare tackle this grievous and unpopular question of metering.

The very great disparity between the returns on rates recovered through meters and by assessment ratings is evidence in itself of how the few who pay the meter rates are penalised. The patience of these consumers is striking.

Some boards are conscious of the difficulty of explaining the large recoveries by meters when compared with assessment recoveries and have endeavoured to mask or reduce this difference by reporting the recoveries by meter only as those due to the excess over the amounts on assessment rating.

In present circumstances where there are no funds from which Government can make generous grants-in-aid the question of shortage in some supplies is likely to grow still more acute and in some towns the outlying services may cease to supply water at all during the hot months of the year.

The cure for this state of affairs is the use of adequate numbers of meters for the supplies pumped more than suffice for the legitimate demand of the populations served, were these supplied properly distributed.

It would be in the public interest, if boards who cannot control their distribution, were to sell the system to some reliable company, licensed in the same manner as electricity supply companies who could be trusted to undertake the duty of water supply.

The unpopularity of controlling water supply by means of meters is apparent from a perusal of appendix no. 1 attached to this report. The number of meters

and their maintenance is the acid test of the willingness of a local authority to properly manage its water supply. Some boards will resort to any other course rather than face this unpopular measure.

The Cawnpore Board is a striking exception from the general run and great credit is due to them for the manner in which they have succeeded in converting a loss of Rs. 1·82 lakhs in the year 1922-23 to a profit of Rs. 2·30 lakhs in last year's working. This board also succeeds in getting most of its works projected and carried out by private agencies independently of Government assistance.

The Lucknow and the Meerut boards still persist in disobeying Government orders regarding their revenue accounts of water supply.

Meerut, Mirzapur and Dehra Dun boards endeavour to carry on their water supplies without any water tax and the Meerut and Mirzapur water supplies are in a most unsatisfactory financial state; as far as Mirzapur is concerned progressive deterioration has been noticed and the system now is in a worse state than hitherto recorded.

The Meerut supply should, if properly maintained, be in the most favourable position of any water supply in the province, having paid back all its original sinking fund and interest charges but it is in a state of rapid deterioration and false economies are being practised.

Drainage—General.

The remarks made in previous reports apply during the year under reference and the drainage of the mohallas of most of the large towns in this province remains a disgrace to the local authorities. Even where sewers have been constructed by the munificence of Government no effort is made to use them intelligently, much less extend the system; the road side drains in almost every case may be seen to be flooded with sullage for want of a connection to the adjacent sewer a work costing only a few hundred rupees.

Drainage construction is the most unpopular work with the staff of this department owing to the delays which take place and the ever present danger of suits for damages.

Authentic records of the limits of public land are almost impossible to procure and as soon as excavation is started numerous objections are raised by property owners in the vicinity of the alignment which entail exasperating delays.

The danger of exceeding estimates in circumstances of this kind is very great and before any drainage work is undertaken in future, it may prove necessary to insist on accurate large scale plans being prepared shewing the extent of public property and the local authority concerned must also be required to deal with all encroachments discovered before construction is put in hand.

The management of sewage farms is a business in which the local authorities lose a considerable amount of income. In order that some basis of calculating the cost of upkeep of a sewage farm and the revenues derivable therefrom might be obtained, the Board of Public Health made a grant so that the Muttra sewage farm might be managed by the Executive Engineer. This farm has only been put under cultivation since 1929 and the average rent per acre per annum realised by public auction has now reached a figure of Rs. 104.

Operations of local authorities and other works.

AGRA.

Waterworks Maintenance.—No improvement can be reported in the condition of the steam, oil engine and centrifugal pumping sets; these have not been properly reconditioned, due to lack of spare parts, which the board have for years persistently refused to order.

No improvement has been made in the number of meters maintained; only one quarter of the total number of ferrule connexions of one half inch size and upwards are metered. The revenue derived from the metered connections was 4·86 annas per thousand gallons compared with 1·80 annas realised by assessment ratings.

The district waste detecting meters have lain in disuse and neglected for years; these require replacement or reconditioning. The district areas and even the zones of high and low pressure have been inter-connected and it is therefore impossible to locate areas and measure the supply where excessive consumption takes place. Government gave a liberal grant for this special purpose amounting to several lakhs of rupees and the failure to maintain the distribution system as designed renders all this large expenditure nugatory.

The increase in the number of connections and in the uncontrolled consumption has reduced the pressure to such an extent that great difficulty is experienced in giving an adequate supply in some of the outlying districts. The demand has already outgrown the capacity of the steam pumping plant and additional filtered

water pumping plant is required. Complaints are becoming increasingly frequent and this water supply is in anything but satisfactory condition. AGRA—(contd.).

Water Supply Improvement, Rs 3·76 lakhs.—The failure to complete the agreement between the Electric Supply Company and the Municipal Board resulted in the new electro-motor driven raw water pumping sets being prevented from working for nine months after the erection of the plant had been completed. This agreement took nearly two years to negotiate. The two new pumping sets were tested in November 1930 and taken over by the Municipal Board that same month. In conjunction with these new pumps an additional rising main to the settling tanks was laid and this together with the two original mains now discharges into a gauging chamber fitted with a rectangular weir and a Paterson "fluxograph" recorder for gauging the water as it enters the settling tanks. Accurate record of all raw water pumped can now be continuously maintained.

In addition to the new pumping plant a Paterson rapid filtration plant of one million gallons capacity per 24 hours was completed in February 1930, but this could not be brought into use before March 1931, because the Municipal Board did not acquire the easement to lay the necessary sludge drain.

Drainage, Rs. 8·00 lakhs.—The Medical Officer of Health recently reported that the sewage flowing along the river front is a nuisance and a grave danger to the health of those using the bathing ghats. It is necessary that something should be done to remedy this condition and meet fully justified complaints.

The comprehensive drainage project prepared in 1919 for Agra City has been shelved each time it has been brought forward for consideration on grounds of lack of funds and there is little hope of anything being effected to alleviate the deplorable state of affairs along the river front, and in the vicinity of the Fort.

ALIGARH.

Water Supply, Rs. 7·49 lakhs.—This new work comprises four tube wells each equipped with a vertical spindle centrifugal pumping set with a rising main and a masonry low zone service reservoir; near the Masjid, two horizontal electro-motor driven high zone pumping sets and a distribution system were brought into use as soon as the pumping plant was started up. After the official tests, the works were taken over by the Municipal Board on the 10th of November. The supply at present is only given to public standposts erected throughout the city.

The boreholes were sunk in 1913 and lay idle until they were again tested in 1928. During this period marked deterioration had taken place in the wells and well no. (1) was found completely choked with sand and brick debris. The wells then showed a yield varying from 180 to 285 gallons per minute and the pumps were each specified to discharge 150 gallons per minute. Unfortunately since 1928 there has been practically no rainfall in Aligarh and the water level presumably owing to this, has fallen about seven feet; the yield from the boreholes has consequently been reduced to an average of 70 gallons per minute each. The pump suctions will have to be lengthened so that a reasonable depression head may be maintained and it is expected that the yield from the wells will be brought up to the designed capacity of the pumps. Since signs are not wanting that the present wells even with the increased yield will not suffice for long to meet the demand at Aligarh, steps are being taken to arrange for additional wells.

Electric energy is afforded by the Aligarh Electric Supply Company. A Lea recorder and gauging weir provides the means of measuring the discharge from the pumps and this gear has been erected at the low zone reservoir. The plant inclusive of workshop machine tools were supplied by the Harland Engineering Company and the whole of this work has been very satisfactorily carried out.

Drainage.—This town possesses a fairly efficient system of surface drains which are maintained in order by the municipal board. The public water supply will soon bring to light any defects in this system and if the town is to be fully supplied with water the time is not far distant when, in the interest of the public, a system of main intercepting sewers will have to be provided.

ALLAHABAD.

Water supply maintenance.—The new works comprised under the reorganization scheme, which include a Paterson rapid filtration plant, electro-motor driven centrifugal filtered water pumping sets and an elevated tank of 500,000 gallons capacity, all at Khusrubagh, as well as the two new intake wells and the three sets of vertical electro-motor driven centrifugal pumps at Karelabagh (riverside) station, have functioned satisfactorily throughout the year. The old steam pumping sets remain as standby plant but these were not put under steam during the year. This steam plant at Karelabagh, it is recommended, should be dismantled and sold. This work was completed in 1930 but the completion report submitted by the board was lacking in so many respects that it could not be accepted and had to be returned for proper compilation.

Although the work of repairing the concrete floors and side walls of the two clear water reservoirs was commenced six years ago and substantial assistance given by Government, this has not yet been completed.

ALLAHABAD—(contd.).

The board are preparing an application for a loan of Rs. 50,000 for the purchase of meters. At present only 370 meters are installed while there are 1,575 unmetered connexions of ½" diameter and upwards in existence.

The Mayo Hall Tube Well electro-motor driven centrifugal pumping sets were maintained in satisfactory running order but there was a marked decrease in the discharge from this well and it is feared that the tube has become choked with sand indicating a failure of the strainer. This well was constructed in 1915.

Water supply improvements, Rs. 0·41 *lakhs.*—This project consists of two tube wells for Civil Lines and forms part of the municipal reorganization scheme. The work was held in abeyance for a long time owing to the inability of the board to acquire sites for the tube wells and deposit the necessary funds. A loan from Government to the extent of the estimated cost has recently been approved and the preparation of specification and tender forms has been taken in hand, the board has been requested to deposit the necessary funds and expedite the acquisition of the sites for the tube wells. The wells will be of a new strainerless type designed to take advantage of the experience gained in tube well construction during the past fifteen years.

Alfred Park water supply, Rs. 0·40 *lakhs.*—This is a provincial work and the scheme consist of a tube well supply intended to replace the existing inadequate supply from the Jumna riverside pumping station. The project has been delayed by certain changes in staff in the second division.

Magh Mela water and electric supply 1930-31, *Rs.* 0·25 *lakhs.*—This work was undertaken on behalf of the Mela Authorities. The water and electric supply distribution were completed in time and a satisfactory supply of water and electricity afforded during the whole period of the Mela.

Drainage Pumping station.—Some little improvement was noticed in the maintenance of the pumping plant and screening gear but there is still a long list of spare parts to be obtained. Owing to the recording meter being out of adjustment and reading too high, impossible figures of efficiency on fuel consumption were being recorded. Electricity is now available from the Supply Company, the petrol driven generating sets for driving the screening and sludging gears, air exhausters, and for lighting should be maintained only as standby plant, for it will be found cheaper to use electric energy from the Supply Company than to use the petrol driven sets.

Drainage.—Some silting has been reported in the main sewers and is probably due to the disuse of the flushing tanks. The board have been advised to investigate this matter.

Complaints concerning Church Road and Lawrenceganj drains have also been received.

In the dispute over the Katra-Colonelganj drainage work between the contractors and the board which was subject to arbitration a loss of over Rs. 4,000 has had to be met.

Sewage farm.—The board derive a good revenue from their farm, but the bulk of the sewage still remains unutilized. The project for extending the farm taken up by the board some time ago has not materialized.

ALMORA.

Water supply improvement, Rs. 1·75 *lakhs.*—The supply from springs on the Siahi Devi mountain has been brought to the town and the distribution system is on the point of completion. This work comprises a gravity main, four inches in diameter which in places works under a head of 2,200 feet of water. This main delivers into a collecting reservoir at Kanker Wala Kothi from which the supply is distributed to the town. The board have been anything but helpful with regard to the carrying out of this work and much delay has thereby been occasioned.

BAHRAICH.

Water supply improvements. Rs. 3·75 *lakhs.*—This is a combined scheme to supply water to both the town of Bahraich and the Dargah Syed Salar during the fair period. The cost to be borne by the Bahraich board amounts to Rs. 3·15 lakhs and Government share for the Mela amounts to Rs. 0·60 lakhs.

It is proposed that the undertaking be managed by a joint board consisting of representatives of the Bahraich municipal board and the Syed Salar Fair Committee.

The projects were submitted to the Board of Public Health in November 1930 for sanction and allotment of funds, but some difficulty has arisen owing to want of funds and lack of unanimity in the respective authorities regarding joint management.

BAREILLY.

Anti-malarial works, Rs. 0·18 *lakhs.*—This work is required to complete the storm channel which will pass under the Railway embankments. Two-thirds of the cost amounting to Rs. 11,847 has already been provided by the Board of Public Health and tenders for the work will be invited as soon as the Railway contribution of Rs. 6,500 is received.

Slaughter houses and drainage improvement, Rs. 1·16 lakhs.—Preliminary proposals have been prepared and presented to the Bareilly board for acceptance and transmission to the Board of Public Health for sanction and for decision regarding assistance by way of funds. BAREILLY (contd.).

Water supply maintenance.—Under the reorganisation scheme, the new intake well at Bhadaini (riverside) pumping station and two electro-motor driven vertical spindle pumping sets, were brought into use in May and after the official tests in June, were taken over by the municipal board. This new plant has functioned satisfactorily and has enabled the high duty Worthington to receive a much needed overhauling. The old steam plant is now merely maintained as stand-by. BENARES.

At Bhelupura, the filtered pumping station, the electro-motor driven centrifugal pumping plant worked satisfactorily throughout the year and has been maintained in good running order. The old steam pumping plant is being retained as stand-by. The tube wells were only brought into use to supplement the supply during time of festivals.

No. 10 slow sand filter being constructed by the municipal board is still incomplete although the original masonry work was finished in March 1929. The board's attention has been drawn to this inordinate delay.

The board disobey Government orders as regards their water works accounts, they credit the meter revenues only with the excess consumption measured and not the whole quantity supplied through the meters. This process obscures the wide difference between the recoveries on assessment and on metered supplies.

There are 1,099 connexions of ½″ and upwards in diameter of which only 161 are metered. The board two years ago set aside Rs. 8,000 for meters but none were purchased. The revenue derived by assessment was 1·86 annas per thousand gallons but the rate by metering is 6·4 to 8·9 annas per thousand gallons. The manner in which this board neglects to control consumption of water will shortly result in demands for further expensive extensions. The supply hours have been increased by one-third and the consumption per head has increased by 12 per cent. due to this extended supply.

The works undertaken by the board through its own staff exhibit unsatisfactory features for instance the gauging basin at Bhadaini and the new slow sand filter bed.

Drainage.—Owing to financial difficulty no improvement in the drainage system of this city has been possible. Cracks in the old underground drains are appearing and are due to settlement. A considerable sum of money is likely to be required for their improvement. Neglect to connect up private foul water drains with sewers still continues. No adequate arrangement of storm water drain exists for the low lying areas which become flooded during heavy rains.

Water supply, Rs. 0·23 lakh.—The work consists of two instalments amounting to Rs. 6,400 and 16,797 respectively. The first instalment was completed and handed over to the Notified Area Committee in 1930. The second instalment was taken up in January 1931 and the major portion has been completed. BHIMTAL.

This committee has been criticised for disposing of a stock of piping and fittings recovered from the work for an insignificant sum when the material was of value.

Water supply improvement.—The previous trial bores having failed to discover sweet water a fresh site for the third trial bore was selected as a last resource. A satisfactory water bearing strata has been found below 218 feet, and it is proposed to construct a 4″ tube well. The estimate for this work has been sanctioned and arrangements are being made to complete the tube well. BRINDABAN.

Drainage improvements, Rs. 3·00 lakhs.—The preparation of a fair project for Brindaban drainage has been postponed as the board requested Government to meet the total cost of the scheme by means of loans and grants. Owing to financial stringency, this was not possible, but it was agreed to apply to the Government of India for sanction to enhanced rates of pilgrims tax proposed by the board with a view to increase their resources in order to undertake this work.

Infectious Diseases Hospital, Rs. 0·45 lakh.—This project was prepared in the Superintending Engineer's office owing to pressure of work in the 1st Division. This project was sanctioned and the necessary funds allotted in March 1931. The work will be carried out by the Executive Engineer, 1st Division, who is preparing the specifications and contract documents with a view to taking up construction.

Drainage, Rs. 0·89 lakh.—This work consists of surface drainage in two instalments. The first instalment only was taken up but the tendered rates being favourable a substantial saving was arrived at. The board, therefore, decided to utilize these savings in improving places requiring urgent attention. This additional work has also been taken up and together with the first instalment is now nearing completion. BUDAUN.

At the request of the board the preparation of a fair project for second instalment is in hand and will be ready shortly.

CAWNPORE. *Water supply maintenance.*—Under the re-organization scheme, which the board have carried out through the agency of Messrs. Lane-Brown and Howlett, Consulting Engineers, the works at Bhaironghat, the riverside pumping station, and at Benajhabar, the filtered pumping station, and the canal supply plant have now been completed. The last works comprising the two canal water supply sedimentation tanks and the venturi meter and ganging house for this supply were taken over in April. The old steam plant is now maintained as stand-by.

The board set aside Rs. 20,000 for the purchase of additional meters and spare parts. It is worthy of note that since 1922-23, when there was a deficit of Rs. 1·82 lakhs the board have made every effort to improve the finances of the water supply. The success with which these efforts have been rewarded is shown by a profit which has averaged Rs. 1·48 lakhs per annum during the last 7 years and amounted to Rs. 1·86 lakhs for the year 1930-31. There are 3,912 connexions of ½" and upwards in diameter of which 1,474 are metered—a far higher proportion of meters than any other municipality in these provinces.

Demonstration tube well.—A demonstration tube well together with the hand pump suitable for village supplies has been completed and set to work satisfactorily. This work is to be used to demonstrate to representatives of local authorities the utility of this type of well. The well is constructed in the compound of the Executive Engineer's workshop and is maintained by him.

Drainage.—Complaints have been received concerning the pollution of the Ganges by the outfall sewer and as long ago as 1920 a forecast of cost was presented to the municipal board for farming this sewage. The board are alive to the advantage of this course both as a means of meeting criticisms regarding the Ganges pollution and as a source of revenue. They deposited the necessary fees last year.

The Executive Engineer, Well Boring Operations Division, could not take up this project owing to shortage of staff and pressure of other important works, but it is now in hand and will be completed shortly.

The reorganization of the Parmat Bazar sewage pumping station in order to increase its capacity to meet the present requirements is also being designed by the Executive Engineer. Certain improvements have been carried out by the board themselves at this station enabling a greater volume of sewage to be dealt with, but further extensions are urgently required.

The board have, through their own staff and in co-operation with the Improvement Trust, made considerable extensions to their drainage system and though much urgent work still remains, Cawnpore is undoubtedly the best served city of the provinces as regards its drainage.

Agricultural College, Rs. 1·18 lakhs.—A project for the drainage, water supply and sewage disposal by the activated sludge process was prepared by the Executive Engineer, Borings, in the year 1928 and forwarded to the Director of Agriculture, United Provinces, for necessary action, but owing to the scarcity of funds the work is held in abeyance.

CHANDAUSI. *Water supply, Rs. 2·22 lakhs.*—A forecast of cost amounting to Rs. 2·22 lakhs was prepared and sent to the municipality in November 1930, but on account of financial difficulty the board have decided to drop the scheme for the present.

CHIRGAON (JHANSI). *Drainage, Rs. 0·13 lakh.*—The work carried out satisfactorily leaving an unspent balance of Rs. 5,883 representing savings on the work. A further scheme for extending the work to utilize this unspent balance is under preparation.

DEHRA DUN. *Water supply maintenance.*—The usual supply was maintained, but this frequently proved insufficient both in quantity and pressure.

Since no water-tax is levied there was a loss on these works of Rs. 9,668 for the year under review.

Water supply improvements, Rs. 0·65 lakh.—Two chlorinating appliances and one water softening plant were included in this work which was commenced in 1929 and completed in 1930. It was found after exhaustive tests that the guarantees, under the contract for the water softening plant were not fulfilled by a large margin. Payments have therefore been withheld and the contractors have been required to make good under the terms of the contract. The chlorinating appliances have proved satisfactory.

Improvements to Kolukhet-Rajpur-Dehra Dun, Pipe line, Rs. 0·17 lakh.—The existing 3" pipe line is now so heavily encrusted that the supply from the springs has been seriously diminished. An estimate has been prepared to replace the three inch pipe line with a four inch pipe line. This project has been presented to the municipal board for approval and provision of funds.

Infectious diseases hospital, Rs. 0·47 lakh.—The work has been financed half by Government grant and half by the board. The contract has been placed and work started. It is expected that it will be completed during the coming year. DEHRA DUN—(contd.).

Water supply maintenance.—The borehole when first constructed and tested in 1925 was rated at 100 gallons per minute; there then followed a drought lasting for almost two years and the spring water level was reduced by about four feet and the yield from the well fell proportionately to 85 gallons per minute. The last monsoon rains were heavy and the water level has risen about six feet and at this level the rated capacity of the plant of 100 gallons per minute is more than maintained. FATEHPUR SIKRI

The system functioned satisfactorily throughout the year and the plant was maintained in good order. The assessment of property has not yet been completed.

Water supply maintenance.—The pumping plant has been maintained in very good order but a progressive decrease in the yield from the four original well strainers has been noticed and the supply available now averages about 450 gallons per minute. FYZABAD.

There was a deficit of Rs. 5,151 in 1929-30, but there has been a profit each year since 1926-27, if 1929-30 is excepted. This year the profit amounts to Rs. 3,479.

There is a considerable unsatisfied demand at Fyzabad and the revenue should improve when the new plant is completed.

The board have been urged to take a loan for the purchase of meters so that proper control may be maintained over the distribution.

Water supply improvement, Rs. 0·50 lakh.—This scheme consists of a new fifth tube well of the strainerless type and a pumping plant to augment the supply from the four existing tube wells which are becoming inadequate for the growing demands. The boring was successfully completed in April 1930. Contracts for the pumping plant and building work have been placed and the work has been started.

The town supply will be increased by 300 gallons per minute when this work is completed.

Electric supply.—During the year under report the board has not been able to come to any arrangement with a private company for a public electric supply.

Ajodhya water supply improvement, Rs. 4·27 lakhs.—For this important pilgrim centre a detailed project for water supply was sanctioned and a successful tube well of the new type was constructed. The gravel feed chamber with the collecting tank was completed and handed over to the municipal board during the year. Funds for the second tube well have now been received and the work will be taken up as soon as the site for this well is acquired by the municipal board.

Ajodhya drainage improvements, Rs. 4·60 lakhs.—A detailed project consisting of three instalments was submitted to the municipal board for acceptance in April 1928, and was also sanctioned by the Board of Public Health in January 1929. The board approached Government for financial assistance with a view to taking up the first instalment but funds were not available and the scheme has been shelved for the present.

Water supply, Rs. 4·17 lakhs.—The municipal board have decided to proceed with a trial boring to test the supply available. The project is in hand. GHAZIPUR.

Drainage, Rs. 0·60 lakh.—A project was prepared by this department and sanctioned by the Board of Public Health in the year 1929, but owing to public opposition to the discharge of foul water in the river, a course which is unavoidable with an open drainage system and which indeed takes place in present circumstances, the construction has been postponed indefinitely. GOKUL.

Water supply, Rs. 1·37 lakhs.—A forecast of cost amounting to Rs. 1·37 lakhs has been provided to the municipal board for their consideration. GONDA.

Water supply, Rs. 3·27 lakhs.—This scheme has been dropped owing to want of funds. GORAKHPUR.

Drainage improvements, Rs. 3·44 lakhs.—A modified scheme, the estimate of which amounts to Rs. 3·44 lakhs, has been prepared and presented to the municipal board for sanction and transmission to the Board of Public Health with proposals for financing it.

Water supply maintenance.—The pumping plant has been maintained in running order but a large number of spare parts are required. The supplementary supply has been arranged for filling the bathing tank from the adjacent canal, thus relieving the pumping station for the piped supply of water for domestic purposes only. GOLAGOKARNNATH.

HARDWAR.

Water supply maintenance.—These works were maintained in good order and the pumping plant functioned satisfactorily. The supply from well no. 3 has fallen under suspicion from bacteriological tests and until the source of contamination has been traced out and dealt with the remaining two wells are being used exclusively for the public supply.

The revenue including Government grant of Rs. 30,000 amounted to Rs. 58,408 whilst the annual costs totalled Rs. 38,436.

Electric supply maintenance.—This supply which is derived from the Bahadurabad hydro-electric station was satisfactorily maintained and no complaints have been recorded. The revenue amounted to Rs. 75,052 whilst the annual costs totalled Rs. 72,969.

Drainage improvements, Rs. 8·14 lakhs.—This project was undertaken with a view to improving the defective drainage of the town, before the next Kumbh Mela which falls in 1933. All arrangements were made to proceed with the first instalment of the work, but at the beginning of the year the Hindu Mahasabha raised objections to the drainage being discharged into the river without treatment and demanded that a sewage farm be provided. This involved appreciable additional expense and Government were not able to accede to the request; in such manner this very urgent sanitary measure has been again indefinitely postponed.

Town improvement.—The preliminary proposals for widening the approaches to the Har-ki-Pairi amounting to Rs. 14·73 lakhs were approved in March 1930 and the municipal board requested a detailed project for only the first instalment costing Rs. 5·9 lakhs. The necessary survey has been completed and the project is well in hand now.

In addition to this a forecast of cost for the town planning of Bhopatwala amounting to Rs. 9·00 lakhs was prepared and the Assistant Director of Public Health was consulted. This project will be completed as soon as the staff is available from other works.

Preliminary proposals, amounting to Rs. 1·12 lakhs for training the Lalta Rao and providing a single span reinforced concrete bridge, have also been prepared and presented to the municipal board before taking up the detailed project.

Jwalapur water supply, Rs. 1·77 lakhs.—A revised project for this work was sanctioned in 1929-30. Specification and tender forms for the first instalment amounting to Rs. 1·19 lakhs were drawn out and printed. Tenders could not be invited as the full funds were not deposited. The board recently forwarded a resolution to the effect that the cost of the scheme was prohibitive and unless it was considerably reduced it was not possible for the board to take up the work. On further scrutiny it was found that no further reduction in the cost of the scheme was possible and the board was informed.

HATHRAS.

Water supply, Rs. 5·32 lakhs.—Two tube wells were completed last year and three more are under construction by contract. The contracting firm has come under penalty for delay in this work which should have been completed in July. It will be necessary to subject all the wells to exhaustive test before proceeding with work on the pumping plant and distribution.

JHANSI.

Water supply maintenance.—For the first occasion in ten years it is possible to record that the municipal board have taken effective interest in their pumping plant. Spare parts have been purchased and the suction pipes leading through the bund at Pahuj reservoir have been partially renewed. The improvement in the working of the engines and pumps is marked and their present condition is much better than they have been for a term of years. Under pressure of complaints arising from water scarcity Rs. 1,490 were spent on more distribution tanks and in longer periods of pumping.

The board can effect economies by insisting on better coal being provided for the price which they pay at present and they could increase the income by installing a greater number of meters as there are only ten in use at present.

Babina water supply scheme, Rs. 36·88 lakhs.—This project work which was taken over by the Railway authorities has now been completed and sent for the consideration of Government. The supply will be a joint concern for the three authorities, namely, the municipal board, the Railway and the Military department.

The Chief Engineer, Sarda Canal, Sir Bernard Darley, has kindly agreed to advise on points concerning the dam for the impounding reservoir and when his advice has been received, the project will be submitted for orders of Government.

Drainage, Rs. 0·22 lakh.—The Municipal Board have requested that a comprehensive scheme for the drainage of the municipality be drawn up on their behalf. This project has been delayed owing to other important works.

JAUNPUR.

Water supply, Rs. 6·00 lakhs.—The preparation of a fair project for a water supply from the river Gumti has been delayed for want of staff. Forecasts of cost of

the alternative schemes indicate that if land inside the fort known as "Karar Bir" be made available for constructing filtration plant and a storage reservoir the cost of this scheme can be very much reduced. The sanction of the Archaeological department for the utilization of a portion of the land inside the fort is being sought. JAUNPUR—(contd.).

Water supply, Rs. 3·27 *lakhs.*—The yield from the first trial bore at depths of 292 feet and 323 feet having proved unsatisfactory a fresh bore was sunk and water found at a depth of 160 feet, but this on analysis proved to be very hard, and as the quantity of water available was also limited, it has been decided to abandon the well and to leave the question of an alternative source of supply, over, until the finances of the Municipal Board are in a more satisfactory condition. KHURJA.

Electric supply, Rs. 1·86 *lakhs.*—This work consisting of a complete distribution system with three sub-stations, was commenced in June, 1929, and completed in the following year and handed over to the Municipal Board in October, 1930. The supply is functioning satisfactorily and derives its bulk energy from the canal hydro-electric grid.

Water supply maintenance.—The pumping plant received fair attention and remained in good running order. A cylinder lining had to be replaced after eighteen months' running and this short service is probably due to unsuitable fuel oil purchased locally. KOSI KALAN.

The yield from the well was maintained throughout the year.

Although a public stand-post supply only was intended under this scheme a limited number of metered private connexions for house and trade supplies are being discussed. A profit of about three thousand rupees has been derived from this supply during the year.

Drainage, Rs. 0·62 *lakh.*—A forecast of cost for this work amounting to Rs. 0·62 lakh has been prepared and presented to the Kosi Notified Area Committee for consideration. The scheme allows for leading the foul water from the two main drains to sumps where it would be lifted by means of bullocks and distributed over a sewage farm.

Water supply maintenance.—Further events during the year have left no doubt that an unprecedented crisis in the Lucknow water supply has been averted by making over the generating station to the United Provinces Electric Supply Company. LUCKNOW.

The pumping stations at Gaughat and Aishbagh caused no complaints during the year subsequent to this transfer, and the plant was maintained in fair order.

In spite of warnings and exhortations, extending over the last five years, no proper effort was made to reinstate the slow sand filters with the consequence that the filters broke down in August and could not be put to use until the end of the following September. The public received only a restricted supply during this period of about one month. As a consequence of this breakdown, work was rushed through in reconditioning the filters and carrying out other long neglected repairs such as the cleaning of the inlet channels and settling tanks, and these activities resulted in more work being done during three months than had been done in the previous three years.

The new Paterson rapid filtration plant, capacity three million gallons per 24 hours, was set to work in May and after satisfactory tests was handed over to the board in August. The original Paterson rapid filtration plant which has for years been worked at a capacity much above that for which it was designed, urgently requires to be overhauled.

No serious attempt has been made to increase the number of meters or to control the waste taking place, which has reached large dimensions. Out of the 2,181 connexions of half-an-inch size and upwards, less than one-quarter are provided with meters. The board still do not realise the necessity for employing a qualified and experienced water works superintendent. They reduced the salary of this post from Rs. 600 to Rs. 400 per mensem though the system entails maintenance charges of Rs. 4·34 lakhs per annum and earns a revenue of Rs. 5·40 lakhs per annum and requires first class attention.

Water supply improvement, Rs. 15·65 *lakhs.*—Both the new main to the cantonments (Rs. 1·26 lakhs) and the new mechanical filtration plant, were completed during the year and handed over. Other items now to be taken up include an elevated reservoir, clear water reservoir and certain urgent portions of the distribution. The board have put in hand work on the distribution and about Rs. 60,000 have already been spent. About Rs. 40,000 worth of work is still in hand by the board's own staff. The board have been warned that the mere laying of pipes is not likely to prove of any permanent benefit in the matter of water supply unless the large number of wasting connexions are subjected to rigorous control and many more meters are applied. The board have applied for a loan of Rs. 5·25 lakhs to cover their programme of new construction.

LUCKNOW—(contd.).

Overflow jail water supply, Rs. 0·50 lakh.—This work was of an emergency nature and both the project work and construction were undertaken by the *Executive Engineer, II division.* The work was successfully completed in a period of six weeks.

Anti-malaria and drainage work, Ghazi-ud-din Hyder canal, Rs. 0·14 lakh.—These works were satisfactorily maintained by the II division. The earthen banks outside the masonry lining have become consolidated and grassed and it is hoped that the cost of maintaining the channel will be reduced in future years. The amount of the estimate for maintenance has been reduced from Rs. 14,000 to Rs. 10,000. The improvement which the foul water sewer and the masonry lining has effected in the sanitary condition has been marked.

Extensions to the Ghazi-ud-din Hyder canal lining and intercepting sewer, Rs. 2 lakhs.—A forecast of cost amounting to Rs. 2 lakhs to extend the canal lining to the intercepting sewer up-stream in the vicinity of the industrial area was prepared, but owing to the paucity of funds the detailed project could not be proceeded with.

Drainage.—Owing to numerous complaints regarding the unsatisfactory condition of the Gumti banks caused by failures on western and eastern intercepting sewers, the municipal board requested that a survey of the whole drainage system be carried out by this department with a view to obtaining an estimate for reinstating the work and putting the sewers into good working condition again.

The forecast which has been prepared shows that a sum of Rs 2·73 lakhs would be required for reinstating the damaged work and that a sum of Rs. 25,000 per annum would be required to maintain the main sewers in proper order including the pumping station. The matter has been reported to Government.

Sewage pumping station.—This station is being neglected; the sludging gear has been out of operation for two years owing to the failure to order the necessary parts for renewing the driving and lifting chains and repair of the buckets. The centrifugal pumps have also fallen into a bad state of repairs.

Sewage farm.—Of the total acreage of 685 only 178 acres are at present farmed and the return from this farm averages Rs. 37 per acre to the board. This farm was leased for a term of five years and it is understood that several of the leases were relet to cultivators. The board have been advised to let the farm for periods of one year only and in order that the board may derive full benefit, to deal with the cultivators direct. They have also been advised to auction the land in plots not exceeding one acre in extent.

MEERUT.

Water supply maintenance.—The filters and the pumping plant at Bhola have been maintained by the Superintendent in good working order in spite of many difficulties.

The board have taken no steps to improve the pressure in the Civil Lines and other outlying areas although many complaints have been made. Many of the bungalow connexions and public standposts yield no supply for weeks together and the distress is great in the vicinity of the Law Courts and the College. There are 509 service connexions of one-half inch size and over, of which only 38 are metered. The board have set aside a sum of Rs. 1,000 for the purchase of meters, a sum which is totally inadequate. If a proper water tax was levied and all property assessed at reasonable amounts there should be a profit on this water works of at least Rs. 20,000 per annum. As matters stood till last year there had been a loss of Rs. 9,500 annually, and it resulted in the board starving the system of necessary repairs grant. This year the revenue hardly covers the expenses.

Electric supply.—Under orders of Government the electric supply scheme of this town was entrusted to the Irrigation branch, Public Works department, owing to its location within the grid area of Hydro-Electric Supply from the canals. The electric supply has been completed.

MIRZAPUR.

Water supply maintenance.—There is a dismal record attached to this supply and it is fortunate that the system is a gravity supply requiring the minimum of attention as regards earthworks and masonry. The cost of water delivered is the lowest recorded in these provinces, yet there was a loss of Rs. 1,140 during the year. This is caused by the board levying no water tax and maintaining only 80 meters out of a total number of about 2,684 private connexions. There were 108 public standposts provided in the original work but the board by numerous additions have increased these to 238. When these works were inaugurated in 1914 between eight and nine hundred meters were installed. The board contribute nothing for the quantities of water used for municipal purposes and it has taken them seven years to effect repairs to the bulk meter. The records of available supply and demand are incomplete and should several dry seasons ensue so that the impounding reservoir is depleted there will be a woeful tale of distress.

MOGALSARAI.

Drainage, Rs. 0·42 lakh.—The project has been sanctioned by the Board of Public Health who have also recommended that the scheme be financed by a

Government grant of Rs. 25,000 and a loan of Rs. 13,000 provided that the notified area committee agree to meet the balance from their own resources. As soon as funds are assured, tenders will be invited and the work taken in hand.

MORADABAD.

Water supply and drain flushing maintenance.—This supply has been shut down since April, 1920, when owing to a fractured crankshaft the oil engine was wrecked. Since then the board have been discussing the replacement of the engine. The sanitation of the town has relapsed into a dreadful state in the meantime.

Water supply improvements, Rs. 0·12 lakh.—This work allowed for the extension of certain pipe lines and the provision of fifteen public standposts. The work was commenced in February, 1929, but was delayed through action of the board. It was however resumed and handed over complete in April, 1930, but no benefit has been derived from it owing to the pumping plant being wrecked.

MUSSOORIE.

Water supply maintenance.—The pumping plant was maintained in good running order at the four pumping stations. The distribution was generally well maintained and an adequate supply was provided at all levels in Mussoorie.

The new pumping station, for the Landaur area, gave every satisfaction and the board derived a full return on the capital expenditure.

All the spare parts recommended by the Mechanical Adviser have been procured, though no major repairs were required at any pumping station during the year.

It is reported that difficulty takes place in meeting the demand specially in Landour Cantonments owing to the large quantities of water required for road watering. The Board's Electrical Engineer suggests that economy could be effected, in the use of water, if the Mall Road surface was treated by spraying with a suitable tar compound, or if it was concreted, and this proposal is well worth careful investigation.

If the total cost of the water supply is taken into consideration, there is a small annual loss to the board, this is due to the low credit from the value of water supplied, namely, annas 12 per thousand gallons. This credit should be adjusted annually to the actual cost of the water pumped, so that the returns of the electricity and water supplies may be susceptible of fair comparison.

Hydro-Electric supply.—The trouble experienced at the headworks of the Galogi power station, from the arrival of large quantities of debris from the motor road construction, in the catchment area above the pipe line intakes, has so far been successfully met.

Proposals are in hand for constructing a new sedimentation tank above the original headworks.

No trouble was experienced on the transmission or distribution lines and the sub-station gave satisfactory service.

A triplicate power pipe line supplementing the two existing power pipe lines is also being considered; this will enable a much greater output to be derived from the Galogi hydro-electric station and will postpone the day when the Diesel generating station at Kallugarh has to be continuously operated. Recourse has had to be taken to running the station more frequently and for longer periods as the demand increases.

The Electrical Engineer reports that during the year he had carried out many tests on meters and that of the total number of 735 meters in Mussoorie in commission, 117 were found to run fast and 136 slow. The maximum acceleration was measured to be as much as 54 per cent. and the maximum retardation 32 per cent. These figures prove indisputably the necessity for greater attention being paid to the meter department establishment and equipment. The Dehra Dun figures so far as they are available confirm the above results.

The numbers of defective private installations which have been recorded are high and the board would do well to pay greater attention by insisting on private consumers maintaining their installations in efficient order. This matter affects the revenue and the reliability of supply in no small degree.

Judging from the state of the buildings at Bhelaru and at Galogi, these civil works require greater attention in their maintenance. The roof of the transformer room at the last mentioned station is leaking and in an attempt to prevent damage from leaks, the loose sheeting laid with stones as a temporary measure, was blown across the high tension feeder line and on one occasion caused a shut down of the supply.

The steadily increasing use of the Diesel station at Kallugarh will necessitate more extensive maintenance work on the engine parts and the existing workshop equipment is insufficient for this purpose. The board would do well to anticipate the greater demands for repairs by arranging for the necessary extensions during the coming year.

MUSSOORIE—(contd.).

It is calculated that the hydro-electric supply undertaking returns a profit of 6·4 per cent. to the board on capital involved.

Drainage.—No complaints have been received concerning the drainage systems installed at Landaur bazaar and the Happy Valley which have functioned satisfactorily. The board have not taken any steps to compel the house-owners in the Happy Valley area to connect up to the sewer, though in the Landaur area some private connexions have been made.

The sewage farm has also been operated successfully and a revenue of Rs. 500 was realized during the year. The value of this farm might be greatly increased if some means could be discovered of diverting the surplus water from the Bhilaru springs on to the land.

The Kulri bazar drainage system which was constructed many years ago has exhibited some defects due to the small sizes of the pipes used and the absence of proper sealed trap connexions.

MUTTRA.

Water supply maintenance.—Since energy is now derived from the Electric Supply Company the Diesel sets are kept in running order for standby purposes only. One per cent. of the total pumping work was effected by set no. 1.

Since the reconstructed well no. 1 has been linked up the former supply of 725 gallons per minute has now been increased to 925 gallons per minute. Besides adding a much needed supply this well has resulted in greater efficiency in pumping as the sets now run closer to their rated capacity.

Some agitation and refusal to pay water rates has taken place in the Sadar bazar area but since the supply was extended and the demands met; rates are now being paid.

The board still do not make sufficient efforts to render the water supply self-supporting, they make no provision for spare parts and repairs of water meters.

The board's orders having been set aside by Government the water works superintendent returned to duty, but on the board again determining to harass him he resigned his post. A new water works superintendent has not been appointed even after a lapse of ten months.

Water supply improvements, Rs. 0·82 lakh.—Both tube wells have been completed. The first is now working satisfactorily as recorded above and the second, a new well no. 5, has been satisfactorily tested. Tenders will be invited shortly for the pumping plant.

Drainage.—The system functioned satisfactorily and the pail dépôts and latrines were in regular use. A shortage of water rendered the working of the latter difficult at times.

Sewage farm, Rs. 0·08 lakh.—The sewage farm was brought into use in May, 1929, and it was agreed that for the first three years it should be run under the supervision of the Executive Engineer, I division, Public Health department. This is the third year of the trial maintenance and the results have been satisfactory. The area has been extended from 29 to 55 acres. The income in the first year amounted to Rs. 12 per acre in the second year to Rs. 75 per acre, and this year the income further increased to Rs. 104 per acre.

Valuable information has been obtained with regard to land treatment of sewage and this will be available in the form of a report when the period of maintenance expires and the farm is handed over to the board.

Sewage pumping station.—The new electro-motor centrifugal pumping sets functioned satisfactorily, but the oil driven set was not maintained in good working order though not frequently used.

MUZAFFARNAGAR.

New Mandi drainage, Rs. 4·63 lakhs.—The project was sanctioned in 1927 but the work was not started until 1929 owing to delay in providing funds. The new Mandi area was originally opened up by the Merchants' Association but later was included in the municipality of Muzaffarnagar. Some friction took place between the local authorities and many obstacles have operated to delay the work. The bulk of the work however has already been completed and handed over to the board. The entire work will shortly be handed over to the board after the flushing arrangements are completed.

NAINI TAL.

Water supply.—There is a tendency for the demand to increase at Naini Tal but nothing approaching the marked manner observed in the majority of plains stations. This is due to the wholesale system of metering employed. The electro-motor driven pumping plant as well as the lake side pumping plant and the chlorinating apparatus were maintained in working order.

Except for fire hydrants and some few new connexions, no large extensions of the supply took place or were projected.

Hydro-electric supply.—As far as is known this supply gave satisfaction throughout the year and periodic records of the lake and consumption of water for power purposes were received in this office. A proposal for extending the supply to Haldwani is under consideration. NAINI TAL—(continued).

Drainage.—The board has not proceeded with the re-laying of the main intercepting and outfall sewer, but have managed to repair this with a view to postponing the spending of further capital. No reports have been received concerning the sewage farm for the treatment tanks.

Mela water supply, Rs. 0·40 lakh.—A tube well of the strainerless type was successfully completed and handed over to the Sajjada Nashin of Piran Kaliar in October, 1929. The distribution piping that has been completed but the contract for the building could not be let as the type of pumping plant had to be settled and the electric supply rates agreed upon by the Irrigation Branch who will undertake the maintenance of the plant. It has been arranged that the Irrigation department will take over the plant and use the tube well water for irrigation purposes and be responsible for the repair of the plant and its maintenance during the Mela period. PIRAN KALIAR.

Contracts for the building of the pumping plant have now been placed and the work started. It is hoped to complete it during the present financial year.

Water supply, Rs. 4·00 lakhs.—Since the board's financial position has been examined, it was found possible to take up the first instalment costing Rs. 2·25 lakhs, and if a grant of Rs. 1·00 lakh, and a loan of Rs. 0·75 lakh could be found in addition to the Rs. 0·50 lakh to be met from the resources of the board. There is however no hope of the grant being available till 1932 at the earliest. RAE BARELI.

Drainage improvements, Rs. 1·48 lakhs.—This work has been held in abeyance owing to financial difficulties.

Infectious diseases hospital, Rs. 0·35 lakh.—The estimate was sanctioned in October 1930 the contract for the construction has been placed and the work is in full swing. It is hoped that it will be completed before the close of the financial year 1931-32. RIKHIKESH.

Drainage improvement, Rs. 13·23 lakhs.—The original project for this work amounting to Rs. 13·23 lakhs was prepared in the year 1922, but as it was beyond the capacity of the municipal board to finance the scheme it was decided to carry out the work piece-meal. So a revised scheme for the first instalment only amounting to Rs. 2·05 lakhs was prepared and presented to the municipal board last year. The project was also administratively sanctioned by the Board of Public Health and it was proposed that the cost of this scheme would be met as below :— SAHARANPUR.

	Rs.
Government grant	75,000
Loan	75,000
Funds of the municipal board	55,165
Total ..	2,05,165

Since no grant is available this financial year, the Executive Engineer, I division, has been instructed to postpone the preparation of the specifications and tender forms.

Drainage improvements, Rs. 2·50 lakhs.—The scheme has been divided into three instalments to be constructed as funds permit and the forecast of cost of the first instalment amounting to Rs. 0·38 lakh was prepared and presented to the board in April 1930 for consideration. Since then nothing has been heard from this board. SIKANDRABAD (district Bulandshahr).

Water supply maintenance.—This supply was maintained in good order and the pumping plant was adequate for the demand during the greater part of the year, though in the hot weather it was pressed to its full capacity. UNAO.

The board have obtained a loan of Rs. 10,000 for the purchase of meters and are preparing proposals for utilizing this sum.

Water supply improvements, Rs. 0·31 lakh.—This work consists of one tube well and a duplicate pumping set enable the hours of supply to be extended. The tube well is in hand and the contract for the additional pumping set has been let. It is hoped to complete and set to work this addition within the present year.

Drainage, Rs. 1·89 lakhs.—Funds have only recently been made available for this work which was sanctioned during the year under review. Contract will be let shortly for the work.

In addition to the works noted above the following miscellaneous works were also undertaken.

Other miscellaneous works.

		Rs.	
1	Agra water supply to Police Lines ..	0·13 lakh	Forecast submitted.
2	Aligarh drainage of water works compound.	0·07 ,,	Fair project submitted.
3	Allahabad District Jail filling of depressions.	0·11 ,,	Construction completed.
4	Bilsi (Budaun) drainage	0·54 ,,	Forecast submitted.
5	Debi Patan (Gonda) water supply tube well.	0·07 ,,	Construction completed.
6	Haldwani (Naini Tal) water supply improvements.	0·06 ,,	Construction completed.
7	Hardwar, laboratory for infectious diseases hospital.	0·11 ,,	Forecast submitted.
8	Kaimganj (Farrukhabad) drainage improvements.	0·06 ,,	Construction in hand.
9	Muttra Banjatra route water supply ..	0·25 ,,	Ditto.
10	Sukhumbhar Debi fair (Saharanpur) water supply improvements.	0·21 ,,	Forecast submitted.

STAFF

Mr. G. McC. Hoey, Superintending Engineer, proceeded on six months and fifteen days combined leave on April 17, 1930 and Mr. F. D. Tunnicliffe took over charge during his absence. Mr. Hoey's return to duty was delayed till March 16, 1931, owing to his being lent for eight months to the Colonial Office on foreign service in an advisory capacity to the Government of Nigeria.

The administrative charge of the Agricultural Engineering section which Mr. Hoey held for about twenty months was made over to the Director of Agriculture before he proceeded on leave.

The Secretary of State in Council having sanctioned the deputation of an Indian Assistant Engineer of this department for training in England for one year in public health works, Mr. H. G. Trivedi, Personal Assistant to Superintending Engineer, Public Health department, was selected for this purpose. He proceeded to England on being relieved by Mr. J. K. Singh, who acted as Personal Assistant to the Superintending Engineer, from May 12, 1930.

Mr. F. J. Mallett held the post of Water Works Engineer and Mechanical Adviser to Government throughout the year and Mr. N. R. Gupta who took over charge from Mr. J. K. Singh acted as Assistant to the Water Works Engineer and Mechanical Adviser.

Mr. W. Saise continued as Executive Engineer, I division, Public Health department, Meerut, and Mr. N. D. Choudhary as Executive Engineer, Well Boring Operations division, Public Health department, Cawnpore, throughout the year.

Mr. S. B. Mathur, now permanent Executive Engineer remained attached to the I division, Meerut, Mr. G. K. Pillai, another permanent specialist officer of this department who was lent to the municipal board, Allahabad, as Reorganisation Engineer, was relieved by the Board on March 1, 1930 and was therefore attached to the second division, Allahabad, till April 13, 1930, when he took over charge of this division from Mr. F. D. Tunnicliffe who came to Lucknow to officiate as Superintending Engineer.

In addition to the six permanent Assistant Engineers of the Public Health Engineering Service, six temporary Engineers, nine subordinates of the Subordinate Engineering Service and eighteen temporary subordinates, the requisite number of the computors, draftsmen and clerks were employed.

The officiating Superintending Engineer inspected all important water works as well as works under construction and the Mechanical Adviser to Government recorded his periodical inspection reports of all open water works and rendered assistance in preparing specifications, advising on tenders and testing of plant.

The Superintending Engineer throughout the year served on the Board of Public Health and also on the Board of Engineers nominated by Government to advise the Kashi Sudhar Trust in regard to the restoration of the Benares ghats. Superintending Engineer and Mechanical Adviser also acted as Government nominees on the Senate, Benares University.

G. McC. HOEY, M. INST. C. E.,
Superintending Engineer, Public Health department, United Provinces.

APPENDICES.

APPEN

Statement of operations of various water works in the

Item number.	Particulars.	Agra.	Allahabad.	Benares.	Cawnpore.	Lucknow.	Meerut.	Mussoorie.	Naini Tal.
	Population.								
1	By census of 1921 in municipality.	163,902	145,653	195,373	195,085	317,167	77,711	12,943	16,517
2	By census of 1921 in cantonments.	22,044	11,567	3,074	21,351	23,399	44,898	2,346	802
3	Inhabitants drawing their supply from mains.	185,946	157,220	198,447	216,436	210,000	77,711	15,289	17,319
	Consumption of water.								
4	Metered supplies—								
	(*a*) Cantonments, million gallons.	159·751	91·404	1·124	9·976	108·710	Nil	5·036	1·893
	(*b*) Trade, million gallons ..	75·398	27·395	1·804	314·899	196·296	30·402	Nil	0·185
	(*c*) Domestic (bungalows, etc.) million gallons.	93·075	28·767	30·892	427·868	133·675	1·047	43·292	16·324
	(*d*) Buildings, million gallons	2·045	6·914	16·972	35·535	10·161	1·405	Nil	0·264
	Total metered supplies, million gallons.	330·209	154·480	50·793	788·278	449·042	32·854	48·381	18·666
5	Unmetered supplies—								
	(*a*) Domestic (assessment or ferrule), million gallons	1,293·811	1,123·403	1,943·940	1,710·553	830·000	217·457	9·994	15·423
	(*b*) Municipal purposes (road watering, irrigation and flushing, etc.), million gallons.	175·950	443·279	191·190	302·130	520·000	3·563	18·325	11·541
	(*c*) Standposts, million gallons	243·239	481·497	495·985	214·939	816·976	199·728	39·976	22·367
	(*d*) Buildings, million gallons	2·461	13·647	4·752	6·000	12·406	Nil	3·331	0·163
	Total unmetered supplies, million gallons.	1,715·511	2,061·916	2,625·867	2,233·022	2,179·382	420·748	66·626	49·994
6	Total quantity supplied during the year (items 4 and 5), million gallons.	2,045·720	(*a*)2,216·396	2,676·660	3,021·300	2,628·424	453·602	(*b*)115·007	(*c*)68·660
7	Daily average supply, million gallons.	5·605	6·072	7·333	8·278	7·201	1·243	0·315	0·188
8	Maximum daily average in any one month, million gallons.	6·943	7·325	7·731	9·626	8·484	1·400	0·408	0·285
9	Consumption per head per day for trade alone, gallons.	1·11	0·48	0·02	3·93	2·56	1·07	Nil	0·08
10	Consumption per head per day for municipal purposes and buildings, gallons.	2·66	8·08	2·94	4·35	7·08	0·18	2·90	1·89
11	Consumption per head per day for domestic purposes, gallons.	26·37	30·06	33·99	29·91	24·65	14·74	17·62	8·94
12	Total consumption per head per day (items 9, 10 and 11), gallons.	30·14	38·62	36·95	38·24	34·29	15·99	20·61	10·86
13	Hours of daily supply ..	10·00	15·50	8·55	16·00	22·00	16·00	24·00	13·23
14	Total hours of pumping during the year.	9,594·00	13,891·25	7,594·65	14,162·00	11,158·52	6,453·75	13,681·75	4,829·92
	Lift of pumps.								
15	From river to settling tanks, feet	46·78	127·60	87·71	43·07	97·57	15·16	Murray 1,811·50	H.Z.1,145·60
16	From filtered water pumps to town distribution, feet.	142·00	100·85	88·60	92·73	57·37	126·58	Mackinon 639·00 Bhillaru 1,885·68	I.Z.451·60 I.Z.252·60
17	Total lift, feet	188·78	228·04	176·31	140·80	154·94	141·74	Average 1,804·05	Average 460·01
18	Total horse power hours during the year in million.	1·47	1·12	1·20	1·41	0·76	0·29	0·76	0·16
	Supply connections.								
	Unmetered.								
19	Number of connexions made during 1930-31.	161	239	731	585	834	88	Nil	2
20	Total number of connexions ..	5,086	6,364	14,872	9,608	10,425	1,965	16	7

(*a*) Includes Mayo Hall pumping 51·139 million gallons.
(*b*) Includes gravity supply 4·780 million gallons.
(*c*) Do. do. 15·241 do.

DIX No. I.

United Provinces for the year 1930-31.

Dehra Dun.	Jhansi.	Mirzapur.	Muttra.	Fyzabad.	Hardwar.	Unao.	Kosi.	Fatehpur Sikri.	*Aligarh.	Remarks.
34,092	54,385	54,994	42,615	51,342	9,024	11,147	6,753	5,175	66,963	
Nil	12,069	Nil	10,235	5,278	Nil	Nil	Nil	Nil	Nil	
34,092	25,000	38,400	42,615	30,000	9,024	9,000	6,753	4,400	60,948	
Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	
0·206	0·896	9·744	0·652	Nil	0·434	Nil	0·410	Nil	Nil	
7·344	2·392	1·124	0·787	9·743	1·080	1·037	0·063	Nil	Nil	
Nil	Nil	Nil	0·067	0·842	1·534	Nil	Nil	Nil	Nil	
7·550	3·288	10·868	1·506	10·585	3·048	1·037	0·473	Nil	Nil	
102·450	2·186	174·630	107·580	75·260	34·433	54·343	Nil	Nil	Nil	
	26·274	51·659	22·417	22·728	19·337		Nil	Nil	Nil	
	26·930	110·376	111·296	45·456	29·567		14·729	10·713	16·320	
	Nil	2·400	2·598	7·076	0·151	Nil	0·026	Nil	Nil	
102·450	55·390	339·065	243·841	150·520	83·538	54·343	14·755	10·713	16·320	
110·000	58·678	349·933	245·347	161·105	86·586	55·380	15·228	10·713	16·320	
0·301	0·161	0·959	0·672	0·441	0·237	0·152	0·042	0·029	0·116	
0·435	0·223	1·036	0·785	0·488	0·391	0·190	0·046	0·041	0·128	
0·02	0·10	0·70	0·04	Nil	0·13	Nil	0·17	Nil	Nil	
8·82	2·88	8·86	1·61	2·80	6·40	16·86	0·01	Nil	Nil	
	3·45	20·41	14·12	11·91	19·76		6·00	6·57	1·90	
8·84	6·43	24·97	15·77	14·71	26·29	16·86	6·18	6·67	1·90	
24·00	9·00	22·00	6·75	8·75	18·00	9·00	10·00	8·00	6·00	
Nil	3,291·50	Nil	4,771·25	6,535·75	3,251·50	4,615·00	1,984·00	1,681·33	2,138·00	
Gravity supply.	—11·48	Gravity supply.	174·10	12·05	175·53	180·00	111·18	202·72	135·00	
	235·00			128·51						
..	223·52	..	174·10	140·56	175·53	180·00	111·18	202·72	135·00	
Nil	0·07	Nil	0·22	0·11	0·08	0·04	0·01	0·01	0·01	
1	10	39	79	145	6	Nil	2	Nil	Nil	
2	81	2,604	1,787	1,138	185	161	2	Nil	Nil	

* Records maintained from 11th November, 1930.

APPENDIX

Statement of operations of various water works

Item number.	Particulars.		Agra.	Allahabad.	Benares.	Cawnpore.	Lucknow.	Meerut.	Mussoorie.	Naini Tal.
	Metered—									
21	Number of house connexions made during 1930-31.		2	39	11	229	28	3	17	25
22	Total number of house connexions.		201	330	121	1,341	428	17	498	352
23	Number of trade connexions made during 1930-31.		9	2	Nil	3	10	Nil	Nil	3
24	Total number of trade connexions.		140	40	40	136	82	21	Nil	15
	Annual charges and cost of water supplied.									
25	Maintenance charges.	Rupees	1,67,846	2,39,300	2,34,523	2,94,343	2,87,012	32,598	71,709	43,077
26	Interest and sinking funds charges.	,,	66,568	1,57,401	90,248	34,522	1,46,936	Nil	28,833	25,589
27	Total charges ..	,,	2,34,414	3,97,301	3,24,771	3,28,865	4,33,948	32,598	1,00,542	68,666
28	Cost per 1,000 gallons per 100 feet lift.	Annas	0·59	0·76	0·79	1·23	1·13	0·81	0·76	2·18
29	Cost per 1,000 gallons maintenance charges.	,,	1·31	1·73	1·40	1·56	1·75	1·15	9·98	10·04
30	Cost per 1,000 interest and sinking fund charges.	,,	0·52	1·14	0·54	0·18	0·89	Nil	4·01	5·96
31	Total charges per 1,000 gallons (items 29 and 30).	,,	1·83	2·87	1·94	1·74	2·64	1·15	13·99	16·00
	Income from water works.									
32	Unmetered—									
	(a) Water rate recovered (assessment or ferrule).	Rupees	1,67,552	3,40,985	2,40,005	3,68,355	3,41,323	26,462	4,568	46,268
	(b) Amount credited to water works for water used for municipal purposes.	,,	21,994	Nil	47,797	Nil	Nil	Nil	Nil	11,002
	(c) Buildings and other receipts.	,,	9,828	10,930	17,683	6,942	46,848	470	1,230	1,816
	Total ..	,,	1,99,374	3,51,815	3,05,485	3,75,297	3,88,171	26,932	5,798	59,086
33	Metered—									
	(a) Sale of water by meter.	,,	98,173	58,928	3,711	1,27,647	1,45,175	5,837	76,704	30,289
	(b) Meter rent ..	,,	2,175	3,557	968	12,467	6,664	102	2,521	2,665
	Total ..	,,	1,00,348	62,485	4,679	1,40,114	1,51,839	5,939	78,225	32,954
34	Total income (items 32 and 33).	,,	2,99,722	4,14,300	3,10,164	5,15,411	5,40,010	32,871	84,019	92,040
	Income and working charges.									
35	Receipts per 1,000 gallons supplied through meter.	Annas	4·36	6·47	1·47	2·84	5·41	2·80	25·37	28·25
36	Receipts per 1,000 gallons assessment rating.	,,	1·30	2·73	1·86	2·69	2·85	1·02	1·39	19·20
37	Receipts per 1,000 gallons on total consumption.	,,	2·30	2·99	1·85	2·73	3·29	1·16	11·69	21·66
38	Profit or loss per 1,000 gallons supplied.	,,	Profit 0·47	Profit 0·12	Loss 0·09	Profit 0·99	Profit 0·65	Profit 0·01	Loss 2·30	Profit 5·66
39	Profit or loss on year's working.	Rupees	,, 59,808	,, 16,999	,, 14,607	,, 1,86,546	,, 1,06,062	,, 273	,, 16,529	,, 24,274

No. I.

in the United Provinces for the year 1930-31—(concluded).

Dehra Dun.	Jhansi.	Mirzapur.	Muttra.	Fyzabad.	Hardwar.	Unao.	Kosi.	Fatehpur Sikri.	Aligarh.	Remarks.
5	Nil	1	1	Nil	Nil	Nil	3	Nil	Nil	
52	6	9	1	41	11	2	3	Nil	Nil	
Nil	Nil	2	Nil	Nil	Nil	Nil	1	Nil	Nil	
2	2	71	17	Nil	2	Nil	1	Nil	Nil	
9,231 12,873	15,419 Nil	7,608 21,788	56,351 18,350	27,141 11,426	27,012 11,424	8,361 Nil	6,367 Nil	3,163 Nil	5,323 22,633	
22,104	15,419	29,396	74,701	38,567	38,436	8,361	6,367	3,163	27,956	
Nil	1·88	Nil	2·11	1·92	2·84	1·85	6·02	2·33	3·87	
1·34	4·20	0·95	3·67	2·70	4·99	2·41	6·69	4·72	5·22	
1·87	Nil	0·99	1·20	1·13	2·11	Nil	Nil	Nil	22·19	
3·21	4·20	1·94	4·87	3·83	7·10	2·41	6·69	4·72	27·41	
Nil	14,177	25,789	59,048	38,355	17,135	6,613	8,760	Nil	Nil	
Nil	Nil	Nil	6,809	1,000	8,784	Nil	Nil	Nil	Nil	
1,842	159	1,136	2,125	1,202	30,469	88	28	Nil	Nil	
1,842	14,336	26,925	67,982	40,587	56,388	6,701	8,788	Nil	Nil	
10,594	1,520	1,180	125	994	1,881	559	282	Nil	Nil	
Nil	97	151	100	465	139	9	Nil	Nil	Nil	
10,594	1,617	1,331	225	1,459	2,020	568	282	Nil	Nil	
12,436	15,953	28,256	68,207	42,046	58,408	7,269	9,070	Nil	Nil	
22·46	7·87	1·96	2·39	2·20	10·60	8·76	9·54	Nil	Nil	
0·29	4·14	1·28	4·46	4·31	10·30	1·97	9·53	Nil	Nil	
1·81	4·35	1·29	4·45	4·17	10·79	2·10	9·58	Nil	Nil	
Loss 1·40	Profit 0·15	Loss 0·05	Loss 0·42	Profit 0·34	Profit 3·69	Loss 0·81	Profit 2·84	..	..	
„ 9,668	„ 584	„ 1,140	„ 6,494	„ 3,479	„ 19,972	„ 1,092	„ 2,708	..	..	

APPENDIX No. I(A).

Statement showing total demand, amount recovered, remissions and arrears of various water works in the United Provinces during the year 1930-31.

Water works stations.	Total demand.	Total amount recovered.	Total amount of remissions.	Arrears on March 31, 1931.		Remarks.
				Total amount.	Percentage.	
	Rs.	Rs.	Rs.	Rs.	Rs.	
Agra	4,37,301	2,93,723	9,437	1,34,142	30·67	
Allahabad	4,80,232	4,14,300	1,889	64,043	13·34	
Benares	4,51,157	3,10,161	6,136	1,34,857	29·89	
Cawnpore	6,70,464	5,15,411	2,320	1,52,733	22·60	
Lucknow	5,49,683	5,40,010	90	9,583	1·74	
Meerut	43,043	32,871	106	10,066	23·39	
Mussoorie	94,720	84,013	336	10,371	10·95	
Naini Tal	96,488	* 92,940	50	3,632	3·76	* Rs. 134 excess recovery.
Dehra Dun ..	12,656	12,436	44	176	1·39	
Jhansi	17,746	15,953	620	1,173	6·61	
Mirzapur	49,944	28,256	177	21,511	43·07	
Mathra	86,173	68,207	3,795	14,171	16·44	
Fyzabad	47,206	† 42,046	1,762	3,483	7·38	† Rs. 85 excess recovery.
Hardwar	59,265	58,408	24	833	1·40	
Unao	11,049	7,269	113	3,667	33·19	
Kosi	11,094	9,070	240	1,784	16·08	
Fatehpur Sikri ..			No assessment.			
Aligarh			No assessment.			
Total ..	31,18,221	25,25,076	27,189	5,66,225	18·16	

APPENDIX No. I(B).

Statement showing number and size of all connections; also number and size of metered connections for the year 1930-31.

Name of stations.	Size of connections.																			Remarks.
	⅛"	3/16"	¼"	⅜"	½"	¾"	⅞"	1"	1¼"	1½"	2"	3"	4"	6"	8"	10"	12"	Unknown connexions.	Total.	
Unmetered supplies.																				
Agra	723	..	848	2,735	520	..	165	75	..	20	..	..	..	..	..	..	..	..	5,086	
Allahabad	621	..	1,198	2,970	1,362	60	48	86	..	10	9	..	..	..	..	..	..	*1	6,364	*2½ inches.
Benares	3,415	..	9,585	931	863	14	19	18	4	1	1	15	1	1	..	..	..	†7	14,872	†T connexions.
Cawnpore	..	651	4,325	2,192	1,466	8	400	440	28	93	..	..	..	..	..	..	..	..	9,608	
Lucknow	..	..	..	8,754	1,265	108	156	116	12	2	2	..	..	..	..	..	..	..	10,425	
Meerut	..	..	..	1,494	440	..	21	10	..	..	..	..	..	..	..	..	..	..	1,965	
Mussoorie	..	..	..	..	16	..	..	..	..	..	..	..	..	..	..	..	..	..	16	
Naini Tal	..	..	..	..	1	..	2	1	1	..	2	..	..	..	..	..	..	..	7	
Dehra Dun	..	..	..	..	1	..	..	1	..	..	..	..	..	..	..	..	..	..	2	
Jhansi	..	..	6	..	63	..	5	2	..	1	4	..	..	..	..	..	..	..	81	
Mirzapur	20	..	265	1,555	481	6	170	59	47	1	..	..	..	..	..	..	..	..	2,604	
Muttra	458	..	1,145	79	108	..	2	..	..	..	..	..	..	..	..	..	..	..	1,787	
Fyzabad	822	..	197	66	53	..	..	..	..	..	..	..	..	..	..	..	..	..	1,128	
Hardwar	60	..	64	7	54	..	..	..	..	..	..	..	..	..	..	..	..	..	185	
Unao	57	..	69	25	10	..	..	..	..	..	..	..	..	..	..	..	..	..	161	
Kosi	..	..	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	Standpost supply.
Fatehpur Sikri	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Ditto.
Aligarh	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
Total	6,176	651	17,708	20,810	6,698	196	998	808	87	128	18	15	1	1	..	..	..	8	54,303	
Metered supplies.																				
Agra	..	3	..	19	62	112	..	76	34	..	19	2	6	..	5	2	..	1	..	341
Allahabad	..	..	..	..	1	128	48	89	55	..	10	16	10	12	1	..	..	..	..	370
Benares	..	..	..	..	..	90	..	23	20	11	9	4	3	1	..	..	..	..	..	161
Cawnpore	..	..	..	1	1	662	..	221	344	9	148	49	32	10	..	..	..	..	..	1,477
Lucknow	..	..	..	..	..	220	..	105	115	..	42	15	6	5	..	1	..	..	†1	†15 inches.
Meerut	..	..	..	..	..	28	..	3	5	..	..	..	2	..	..	..	..	..	..	510
Mussoorie	..	..	..	..	..	441	..	51	6	..	..	..	..	..	..	..	..	..	..	38
Naini Tal	..	..	..	..	..	93	252	17	4	..	1	..	..	..	..	..	..	..	..	498
Dehra Dun	..	..	..	..	..	35	..	4	13	..	2	..	..	..	..	..	..	..	..	367
Jhansi	..	..	..	..	..	..	..	1	1	..	3	3	..	..	..	..	..	..	..	54
Mirzapur	..	..	..	..	..	1	17	33	18	2	7	..	1	..	1	..	..	..	..	8
Muttra	..	..	..	..	..	13	..	2	..	1	1	1	..	..	..	..	..	..	..	80
Fyzabad	..	..	..	..	..	13	..	12	11	..	..	..	..	..	..	..	..	..	..	18
Hardwar	..	..	..	..	..	10	..	..	1	..	..	..	..	..	..	..	..	..	..	41
Unao	..	..	..	2	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..	13
Kosi	..	..	..	..	..	3	..	..	1	..	..	..	..	..	..	..	..	..	..	2
Fatehpur Sikri	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	4
Aligarh	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Standpost supply. Ditto.
Total	..	3	..	22	64	1,855	317	638	628	23	242	90	60	28	7	3	..	1	1	3,982

APPENDIX

Annual maintenance accounts of

Particulars.	Agra.	Allahabad.	Benares.	Cawnpore.	Lucknow.	Meerut.	Mussoorie.
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
I.—Establishment.—							
(a) Pumping ..	18,488	* 39,263	28,048	20,682		9,756	9,189
(b) Workshops ..	5,175		10,279	5,466		..	..
(c) Settling tanks and filters.	492	6,121	321	11,196		402	..
(d) Inlet chambers, well and grounds, etc.	..		..	..	43,244	..	..
(e) Distribution ..	10,413	11,962	13,955	15,716		3,800	1,940
(f) Clerical staff ..	1,932	Included in (a) and (b).	4,602	3,335		966	..
(g) Menial staff ..	3,119		1,157	776		1,200	1,347
(h) Office contingencies ..	2,858	1,702	788	244	1,081	1,240	1,541
(i) Rent	416		537	563	836	60	30
II.—Fuel, lubricants and stores.—	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(a) Fuel (coal, fuel oil or electric energy).	70,973	1,52,392	1,47,017	1,22,289	1,80,232	..	40,114
(b) Lubricating oil ..	8,217	1,728	974	676	69	403	99
(c) Waste	658		1,050	..		200	
(d) Packing	600	2,007	177	..	1,015	428	710
(e) Petty stores ..	6,946		5,489	2,971		808	
III.—Intake.—							
(a) Training river ..	6,138	..	..	918	..	..	..
(b) Cleaning channels and wells.	5,451	..	..	..	114	62	..
IV.—Settling tanks and filters.—							
(a) Cleaning settling tanks and wells.	1,404	..	2,201	334	29,012	47	..
(b) Cleaning and renewing filter-beds.	6,949	8,227	2,947	..	3,712	1,365	..
(c) Purchase of sand ..	13,431	5,002	2,021	2,626	15,180	730	..
(d) Purchase of alumino-ferric.	..	5,270	4,639	9,518	..	2,351	..
V.—Distribution.—							
(a) Pipes and fittings ..	529	2,869	829	5,860	3,711	776	4,722
(b) Meters	458		285	12,321	540	..	7,070
(c) Standposts or hydrants	870		..	..	..	..	..
VI.—Repairs.—							
(a) To tanks	350	..	..	9	..	..	1,074
(b) To buildings and ground.	1,810	1,562	3,215	500	327	969	604
(c) To machinery ..	98	1,046	2,477	1,588	4,553	884	2,232
(d) To rising main ..	..	..	..	..	..	..	..
(e) To tools and plant ..	71	..	..	942	..	..	..
VII.—Water analysis ..	..	749	1,426	307	2,516	771	1,087
VIII.—Cost of water—							
Canal department dues ..	1,000	..	..	75,000	..	5,375	..
Total ..	1,67,846	2,39,900	2,34,523	2,94,343	2,87,012	32,598	71,709
Interest and sinking fund charges.	66,568	1,57,401	90,248	94,522	1,46,936	..	28,833
Grand Total ..	2,34,414	3,97,301	3,24,771	3,28,865	4,33,948	32,598	1,00,542

*Includes Rs. 1,505 paid to Messrs. Mather and Platt, Ltd., for running electric plant at Karolabagh.

(1) Rupees 4,780 in excess of consumption. Electrical charges, for Maithan and Chilli Int. Rs. 1,510, for Raw water Rs. 10,444 and cost of fuel oil Rs. 12,473.

(2) Rupees 9,296 in excess of consumption. Cost of coal for workshop, etc., Rs. 728, fuel oil for Daraganj Rs. 1,118 and electrical charges for Mayo Hall Rs. 3,918.

(3) Rupees 3,264 less on consumption. Electrical charges for Bhelupura and Bhadaini Rs. 1,97,009.

(4) Electrical charges. Coal worth Rs. 1,351 was used for workshop and municipal purposes.

(5) Electrical charges. Coal worth Rs. 257 was used for workshop and municipal purposes.

(6) No fuel was purchased during the year. Pumping done by turbines. Last year's stock was used for banking engines and workshop.

(7) Electrical charges.

No. II.

water works during the year 1930-31.

Naini Tal.	Dehra Dun.	Jhansi.	Mirzapur.	Muttra.	Fyzabad.	Hardwar.	Unao.	Kosi.	Fatehpur Sikri.	Aligarh.
Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
	..	3,335		8,041	6,405	2,675	1,653	1,196	1,116	1,334
	..	..		660	1,915	1,636	..	..	..	..
	..	..	4,440	..	..	..	..	..	..	..
6,844	..	..		..	..	..	..	..	..	..
	..	..		3,360	1,920	2,718	564	1,094	188	222
	2,757	..	380	..	717	554	..	540	..	..
	4,236	..	902	234	1,483	455	271	126	306	233
465	122	348	490	626	1,058	426	35	846	21	17
..	..	..	..	..	..	..	4	..	12	..
(8) 31,817	..	(9) 4,936	..	(10) 42,341	(11) 7,970	(12) 16,551	(13) 2,651	(14) 629	(15) 654	(16) 3,059
132	..	200	..	126	1,894	75	1,711	299	227	13
39	..	20	..	70	..	27	107	25	49	2
102	..	157	..	77	92	50	..	..	17	..
361	..	100	..	325	1,214	100	187	88	116	16
..	..	204	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..
885	1,803	738	22	88	614	48	..	426	..	..
..	..	116	..	..	..	..	..	..	..	..
..	..	..	39	..	101	..	..	..	5	12
137	..	..	654	..	589	177	..	42	..	..
..	..	..	375	281	224	436	..	22	17	..
1,261	..	203	..	127	674	350	813	658	5	55
..	..	18	..	..	..	..	..	..	..	..
137	..	68	..	..	77	432	..	291	430	..
1,897	318	..	306	..	194	300	365	85	..	355
..	..	4,981	..	..	..	..	..	..	..	..
43,077	9,231	15,419	7,608	56,351	27,141	27,012	8,361	6,867	3,168	5,868
25,589	12,873	..	21,788	18,350	11,426	11,424	..	..	..	22,633
68,666	22,104	15,419	29,396	74,701	38,567	38,436	8,361	6,867	3,168	27,956

(8) Electrical charges.
(9) Rupees 1,712 less on consumption.
(10) Electrical charges, fuel oil worth Rs. 124 was used for pumping by Diesel engines and Municipal purposes.
(11) Rupees 1,212 less on consumption.
(12) Electrical charges.
(13) Rupees 480 less on consumption.
(14) " 66 less on consumption.
(15) " 132 in excess of consumption.
(16) Electrical charges.

APPENDIX No. III.

Statement showing costs initial of subsequent extensions and improvements, chargeable to capital on the various water works in the United Provinces for the year ending March 31, 1931.

Water works stations.	Initial capital cost.	Cost of subsequent extension, etc.	Expenditure during the year 1930-31.	Total.
	Rs.	Rs.	Rs.	Rs.
Agra	11,70,761	23,59,305	17,616	35,47,682
Allahabad	16,24,061	27,84,282	32,781	44,41,124
Benares	25,61,881	17,60,611	71,958	43,94,450
Cawnpore	14,44,570	21,59,315	21,778	36,25,663
Lucknow	15,15,736	47,74,375	1,21,546	64,11,657
Meerut	7,51,710	67,987	1,648	8,21,345
Mussoorie	4,79,754	7,86,226	16,276	12,82,256
Naini Tal	2,47,000	8,00,870	3,744	10,51,614
Dehra Dun	97,241	3,77,778	3,546	4,78,565
Jhansi	96,556	97,226	Nil	1,93,782
Mirzapur	5,98,492	1,31,186	4,415	7,34,093
Muttra	5,17,288	90,596	13,661	6,21,545
Fyzabad	9,48,662	45,438	837	9,94,937
Hardwar	1,96,919	2,88,776	2,500	4,88,195
Unao	1,18,664	17,329	7,433	1,43,926
Kosi	70,322	422	557	71,301
Fatehpur-Sikri	52,034	Nil	Nil	52,034
Aligarh	5,70,992	Nil	828	5,71,820
GRAND TOTAL ..	1,30,62,643	1,65,37,222	3,21,124	2,99,20,989

APPENDIX No. IV.

Statement showing filter area out of operation, rate of filtration, and results of water analyses of the water works in the United Provinces during the year 1930-31.

Water works.	Sand filter area of operation per million gallons pumped sq. feet.	Filtration rate in gallons per square foot per day of sand filter.			Water from supply mains.						
					Chemical analyses.			Bacteriological analyses.			
		Maximum.	Minimum.	Average.	Good.	Bad.	Total.	Number of samples tested.	Number of samples containing over 100 colonies.	Average number of microbes per c. c.	Percentage (on total) of samples over 100 per c. c.
Agra ..	2,679	34·00	24·00	31·73	4	..	4	476	Nil	41·16	Nil
Allahabad ..	7,951	50·00 *1,834	10·00 *1,012	28·12 *1,418·5	3	1	4	623	40	42·13	6·42
Benares ..	4,548	50·00	37·50	47·29	5	..	5	483	22	76·50	4·55
Cawnpore ..	950	62·00	18·00	45·97	4	..	4	695	Nil	19·17	Nil
Lucknow ..	33,255	56·20 *2,217	6·20 *328	30·33 *1,576	5	1	6	264	9	28·61	3·40
Meerut ..	5,132	31·00	25·00	30·53	4	..	4	252	Nil	27·15	Nil
Mussoorie ..	Water supply from deep springs and is not filtered.				5	..	5	109	Nil	20·95	Nil
Naini Tal ..					4	..	4	104	19	63·11	18·27
Dehra Dun ..					14	..	14	124	59	142·39	47·58
Jhansi ..	..	Information not available.									
Mirzapur ..	Gravitation supply.				1	..	1	73	Nil	59·32	Nil
Muttra ..	Tube-well supply.				4	..	4	115	2	52·26	1·74
Fyzabad ..					4	..	4	167	Nil	14·91	Nil
Hardwar ..					8	..	8	219	29	27·00	13·24
Unao ..					3	..	3	26	8	67·04	30·77
Kosi ..					2	..	2	8	3	3·20	37·50
Fatehpur Sikri ..		Information not available.									
Aligarh ..					..	1	1	33	26	386·39	78·78

*Paterson Filters.

APPENDIX No. V.

Details of pumps, filters, tanks, reservoirs, rising mains, etc., in the water works of the United Provinces for 1890-91.

Item No.	Particulars.	Agra.	Allahabad.	Benares.	Cawnpore.	Lucknow.	Meerut.	Mussoorie.	Naini Tal.	Dehra Dun.	Jhansi.	Mirzapur.	Muttra.	Pyaloal.	Hardwar.	Unao.	Kosi.	Fatehpur-Sikri.	Aligarh.
1	Floor levels:—																		
	Unfiltered Station R. L.	505·07'	Steam 295·00' plant. Electric 295·00' plant.	254·03'	402·00'	367·50'	795·50'	Murray Spring 5,494'	..	Gravitation supply	149·00'	Gravitation supply.	560·00'	939·57'	941·89'	451·84'	512·40	567·00'	..
	Filtered Station R. L.	505·07'	321·25'	262·00'	410·00'	395·50'	795·50'	Bhilaun Spring 5,700'	..	..	..	..	..	..	..	..	..	..	..
2	Highest water level during the year, R. L.	494·07'	272·80'	255·05'	373·07'	349·50'	865·00'	Machinon Spring 6,000'	..	..	167·05'	450·00'	..	..	..	..	..	542·03'	..
3	Lowest water level during the year, R. L.	481·30'	234·00'	190·00'	357·00'	342·50'	771·00'	Landour Spring 6,000'	..	..	750·00'	453·50'	..	..	..	..	..	537·03'	..
4	Particulars of plant:—																		
	Unfiltered Station ..	9 Diesel sets .. 1 L. D. Worthington. 2 Mather and Platt motor driven vertical spindle centrifugal pump.	1 Triple expansion rotary. 2 Beam engine. 3 Mather and Platt "Lonowave" centrifugal pump direct driven by A. C. motors.	1 H. D. Worthington. (Standby). 3 Gasoline sets. (Standby). 3 Worthington vertical spindle centrifugal pumps direct driven by G. E. C., A. C. motors.	1 Triple expansion rotary. (Standby). 2 Vertical spindle centrifugal pumps direct driven by A. C. motors at river side. 2 Sets of centrifugal pumps direct driven by electric motor at unfiltered station Bangalbar.	3 Mather and Platt motor driven "Medivane" centrifugal pumps.	2 Water power turbines. 1 Semi-portable engine.	Murray Spring:— Two sets electrically driven geared three ram pumps single reduction gearing. Bhilaun Spring:— Two sets as above. Machinon Spring:— Two pumps as above but with double reduction gearing. One semi-diesel oil engine. Landour:— Two sets of Worthington-Simpson three throw single plunger power pumps driven by Metropolitan-Vickers reduction motors.	Lake Station:— 1 Motor driven Worthington centrifugal pump. Main Station:— Three L. D. Worthington (Dismantled). Four Mather and Platt motor driven pumps. Two triple ram geared pumps.	..	2 Worthington compound steam engine and pump.	..	2 Two cylinder Mirrlees Diesel engines. D. C. generator motor driven Mather and Platt centrifugal pumps. One set converted to A. C. motor taking energy from the Electric Supply Company.	2 Two cylinder Mirrlees engines and motor-driven Mather and Platt centrifugal pumps.	3 Mather and Platt centrifugal pumps driven by A. C. motors.	One 90 B. H. P. Tangye crude oil engine. 1 Sullivan air compressor. 2 Air lift pumps in tube wells and 6" Worthington centrifugal pumps.	One 16 B. H. P. Tangye crude oil engine. One single stage double acting belt driven Sullivan air compressor. One standard Sullivan air lift pump in tube well. One belt driven Worthington Simpson two stage centrifugal pumps.	One 16 B. H. P. Tangye crude oil engine. One Sullivan air lift pump in tube well. One single stage double acting Sullivan horizontal air compressor. One Duplex reciprocating pump.	*High Zone.* Two Harland Engineering horizontal centrifugal pumps direct driven by A. C. motors. *Low Zone.* Four Harland Engineering Borehole vertical pump direct driven by A. C. Motors.
	Filtered Station ..	2 Belts and Mawson. 1 H. D. Worthington. 2 Beams. 2 Motor driven Worthing Simpson centrifugal pumps at Mather and Chalk Ink.	3 Mather and Platt "Lonowave" centrifugal pumps direct-driven by A. C. motors. 2 Beams (Standby).	4 Horizontal centrifugal pumps direct driven by G. E. C., A. C. motors. 2 Pairs of coupled beams (Standby).	3 L. D. Worthington. (Standby). 1 H. D. Worthington. (Standby). 3 Sets of centrifugal pumps direct driven by A. C. motors.	3 Mather and Platt "Medivane" centrifugal pumps driven by A. C. motors.	2 Water power turbines.	..	..	..	..	..	..	..	..	..	..	..	..
5	Capacity of pump:— Unfiltered station G. P. M.	Diesel sets 5,000 each. L. D. Worthington 1,700 each. Mather and Platt centrifugal pump 2,300 each.	Triple expansion set 2,700. Beam set 2,100 each. Motor pumps 3,000 each.	H. D. Worthington 3,833. Gasoline 1,800 each. Motor pumps 3,000 each.	Triple expansion 3,025. Motor pumps. River side 3,000 each. Beam Mather 3,600 each.	Motor pumps 7,500 each.	1,200 each	..	Murray spring 193. Bhilaun spring 192. Machinon spring 89. Landour spring 55.	Lake side pump 339. Main—One pump 218. Two pumps 55 each. H. Z. 125 each. L. Z. 175 each. L. Z. 210 each.	..	350 each	..	..	1,000 each	..	240 each	..	400	..	140	..	35	H. Z. 200 each. L. Z. 150
	Filtered station G. P. M.	Balls 3,000 each. H. D. Worthington 4,000. Beam 2,700 each. Worthington 400 each.	Beams 2,100 each. Bilaun pumps 2,700 each.	Beams 1,500 each. 4 Motor-driven centrifugal pumps. 2-3,000 each. 1-4,000.	H. D. Worthington 4,725. L. D. Worthington 4,500 each. Motor pumps 2,400 each.	3 motor pumps:— 1-4,000. 2-4,800 each.	1,100 each	..	..	..	..	..	..	..	..	..	..	..	..

APPENDIX No. 5—(continued).

Details of pumps, filters, tanks, reservoirs, rising mains, etc., in the water works of the United Provinces for 1890-91.

No.	Particulars.	Agra.	Allahabad.	Bareilly.	Cawnpore.	Lucknow.	Meerut.	Mussoorie.	Naini Tal.	Dehra Dun.	Jhansi.	Mirzapur.	Moradabad.	Pilibhit.	Hardwar.	Unao.	Kosi.	Sahibganj-Sikri.	Aligarh.
6	Number of:— (a) Rising mains. (b) Leading mains. (c) Distribution mains.	Three .. Fourteen .. Not supplied ..	Two .. Fourteen .. Eleven ..	Two .. Six .. Twelve ..	Two .. Six .. Twelve ..	Two .. One .. Eighteen ..	Two .. Not supplied .. Ten ..	Four .. Five .. Six ..	Six .. Six .. Two ..	Not supplied. Six. Eleven.	One .. One .. Ten ..	One .. Eight .. Five ..	One .. Three .. Fourteen ..	One .. One .. Eleven ..	Four .. Seven .. Three ..	Two .. Ten .. Three ..	One .. One .. Four ..	One .. One .. Four ..	Three. Two. Eight.
7	Length and size of:— (a) Rising mains.	1. 10,400 ft. 20" 2. 7,300 „ 18" 3. 13,450 „ 8"	1. 3,500 ft. 20" 2. 5,250 „ 12"	1. 4,000 ft. 31" (old). 2. 4,055 „ 24" (new).	1. 2,000 ft. 24" 2. 4,000 „ 18"	1. 13,941 ft. 27" 2. 17,500 „ 20"	1. 38,220 ft. 15" 2. 8,685 „ 12"	1. 4,500 ft. 9" 2. 3,600 „ 8" 3. 1,300 „ 30" 4. 3,300 „ 9"	1. 1,200 ft. 9" 2. 9,857 „ 9" 3. 1,795 „ 8" 4. 4,910 „ 8" 5. 9,494 „ 8" 6. 9,484 „ 8½"	Not supplied.	1. 19,272 ft. 9"	1. 30,352 ft. 12"	1. 4,817 ft. 12"	1. 7,047 ft. 14"	1. 4,050 ft. 15" 2. 441 „ 12" 3. 538 „ 10" 4. 577 „ 8"	1. 1,250 ft. 6" 2. 510 „ 8"	1. 2,560 ft. 6"	1. 3,395 ft. 8"	1. 9,806 ft. 15" 2. 1,000 „ 7" 3. 165 „ 8"
	(b) Leading mains.	1. 4,000 ft. 18" 2. 9,250 „ 18" 3. 8,900 „ 12" 4. 975 „ 15" 5. 8,650 „ 12" 6. 700 „ 18" 7. 1,600 „ 12" 8. 3,350 „ 12" 9. 900 „ 10" 10. 2,650 „ 10" 11. 1,950 „ 9" 12. 1,740 „ 8" 13. 1,400 „ 7" 14. 4,018 „ 4"	1. 950 ft. 30" 2. 2,541 „ 25" 3. 3,810 „ 20" 4. 13,345 „ 16" 5. 4,328 „ 12" 6. 6,975 „ 14" 7. 1,040 „ 12" 8. 1,080 „ 10" 9. 3,050 „ 9" 10. 4,483 „ 8" 11. 6,585 „ 7" 12. 3,420 „ 6" 13. 3,400 „ 5" 14. 4,018 „ 4"	1. 10,864 ft. 20" to 9". 2. 21,833 „ 20" to 6". 3. 3,217 „ 18"	1. 7,500 ft. 32" 2. 1,575 „ 24" 3. 8,50 „ 18" 4. 4,4 0 „ 20" 5. 1,5 0 „ 18" 6. 5,600 „ 16"	1. 1,450 ft. 20"	Not supplied.	1. 7,680 ft. 4½" 2. 2,155 „ 4" 3. 5,350 „ 3½" 4. 7,000 „ 3" 5. 7,145 „ 3"	1. 5,250 ft. 9" 2. 3,300 „ 9" 3. 30,551 „ 8½" 4. 13,070 „ 7" 5. 16,804 „ 7½" 6. 5,668 „ 7½"	1. 7,970 ft. 9" 2. 17,405 „ 9" 3. 9,01 „ 8" 4. 6,500 „ 8" 5. 22,000 „ 8½" 6. 12,500 „ 8"	1. 238 ft. 10"	1. 5,196 ft. 10" 2. 3,859 „ 10" 3. 1,663 „ 10" 4. 1,391 „ 10" 5. 9,616 „ 9" 6. 5,978 „ 8" 7. 1,386 „ 6" 8. 1,099 „ 4"	1. 9,14 ft. 10" 2. 1,155 „ 12" 3. 660 „ 12"	1 50 ft. 10"	1. * 260 ft. 10" 2. 5,828 „ 10" 3. 6,372 „ 10" 4. 2,243 „ 8" 5. 4,284 „ 6" 6. 1,149 „ 4" 7. 310 „ 3"	311	1. 125 ft. 7"	1. 3,204 ft. 9"	1. 4,315 ft. 20" to 9". 2. 3,207 „ 18" to 7".
	(c) Distribution mains.	Not supplied	1. 7,240 ft. 15" 2. 6,501 „ 12" 3. 1,924 „ 10" 4. 3,073 „ 9" 5. 14,513 „ 8" 6. 10,575 „ 7" 7. 34,375 „ 6" 8. 14,634 „ 5" 9. 96,238 „ 4" 10. 48,151 „ 3" 11. 10,778 „ 2" Note.—Rider is included in the distribution mains.	1. 880,159 ft. 18" to 3".	1. 600 ft. 15" 2. 855 „ 14" 3. 2,040 „ 12" 4. 4,100 „ 11" 5. 9,456 „ 10" 6. 8,075 „ 9" 7. 14,055 „ 8" 8. 10,319 „ 7" 9. 17,300 „ 6" 10. 43,275 „ 5" 11. 4,840 „ 4" 12. 77,497 „ 3"	1. 1,900 ft. 21" 2. 3,100 „ 20" 3. 3,917 „ 18" 4. 3,411 „ 16" 5. 4,705 „ 15" 6. 2,077 „ 13" 7. 7,056 „ 12" 8. 9,0 5 „ 11" 9. 4,100 „ 10" 10. 17,057 „ 9" 11. 13,157 „ 8" 12. 13,461 „ 7" 13. 18,061 „ 6" 14. 71,813 „ 5" 15. 63,165 „ 4" 16. 143,947 „ 3" 17. 4,850 „ 2" 18. 380 „ 1½"	1. 911 ft. 11" 2. 66 „ 10" 3. 1,017 „ 7" 4. 701 „ 6" 5. 1,030 „ 5" 6. 8,793 „ 4" 7. 10,096 „ 3" 8. 4,514 „ 2" 9. 730 „ 1" 10. 591 „ 1"	1. 9,350 ft. 9" 2. 11,955 „ 8" 3. 21,180 „ 1½" 4. 4,850 „ 1½" 5. 8,575 „ 1" 6. 3,040 „ 1"	1. 22,566 ft. 1" 2. 24,600 „ 1"	1. 4,620 ft. 9" 2. 10,569 „ 8" 3. 12,750 „ 8" 4. 10,753 „ 7½" 5. 8,973 „ 7" 6. 4,400 „ 12" 7. 7,990 „ 11" 8. 3,780 „ 13" 9. 13,074 „ 1" 10. 3,865 „ 1" 11. 369 „ 1"	1. 2,970 ft. 8" 2. 1,980 „ 8" 3. 9,075 „ 6" 4. 3,560 „ 4" 5. 7,450 „ 4" 6. 16 „ 3" 7. 16 „ 3" 8. 16 „ 3" 9. 16 „ 3" 10. 16 „ 3"	1. 587 ft. 7" 2. 1,386 „ 6" 3. 9,007 „ 5" 4. 8,058 „ 4" 5. 51,076 „ 3"	1. 6,031 ft. 9" 2. 1,156 „ 6" 3. 660 „ 8" 4. 2,860 „ 7" 5. 3,630 „ 6" 6. 7,766 „ 5" 7. 11,044 „ 4" 8. 13,441 „ 3" 9. 660 „ 2½" 10. 8,833 „ 2" 11. 159 „ 1½" 12. 14,016 „ 1" 13. 1,320 „ 1" 14. 9,058 „ 1"	1. 45 ft. 15" 2. 198 „ 14" 3. 63 „ 12" 4. 1,176 „ 10" 5. 9,900 „ 9" 6. 1,869 „ 8" 7. 7,126 „ 7" 8. 7,250 „ 6" 9. 7,050 „ 5" 10. 16,350 „ 4" 11. 24,721 „ 3"	1. 3,500 ft. 9" 2. 8,650 „ 8" 3. 2,769 „ 3" Note.—This is one length of 1½" pipe used common for rising and leading.	1. 681 ft. 5" 2. 1,155 „ 4" 3. 42,011 „ 2"	1. 1,700 ft. 6" 2. 1,210 „ 4" 3. 9,735 „ 3" 4. 1,800 „ 2½"	1. 681 ft. 12" 2. 654 „ 12" 3. 393 „ 7" 4. 1,016 „ 5"	1. 75 ft. 6" 2. 924 „ 8" 3. 6,624 „ 7" 4. 8,841 „ 3" 5. 22,193 „ 2" 6. 20,715 „ 4" 7. 13,722 „ 3" 8. 9,417 „ 2½"
8	Number of settling tanks.	Five ..	Three ..	Three ..	Five ..	Three ..	Three ..	..	..	..	..	..	..	..	..	..	..	..	..
9	Size of settling tanks.	200' × 100' × 10' each.	Two 240' × 200' Bottom 200' × 10'. Height 10·75'.	Nos. 1 and 2—400·5' × 258·5' × 18' each. No. 3—400·5' × 258·5' × 18'.	Three—400·5' × 258·5' × 18' each. Two—300·5' × 258·5' × 8' each.	240' × 200' × 10·5 each.	100' × 60' × 11' each.	..	..	..	..	..	..	..	..	..	..	..	..
10	Capacity of settling tanks. Gallons.	1,500,000 each.	Nos. 1 and 2—4,400,000 each. No. 3—4,650,000.	Nos. 1 and 2—3,142,750 each. No. 3—3,322,740.	Three—1,942,450 each. Two—1,000,000 each.	1,000,000 each.	128,000 each.	..	..	..	..	..	..	..	..	..	..	..	..
11	Number of:— (a) Slow sand filters.	Seven ..	Six ..	Nine ..	Nine ..	Seven ..	Four ..	..	One chlorine plant	..	..	..	..	..	..	..	..	..	..
	(b) Mechanical filters.	Two ..	Five ..	..	..	Ten ..	..	..	..	..	..	..	..	..	..	..	..	..	..
12	Size of:— (a) Slow sand filters.	300' × 100' each.	300' × 100' each.	300' × 100' each.	300' × 100' each. Two Global 150' × 25' each.	300' × 100' × 7' each.	150' × 100' each.	..	..	..	..	..	..	..	..	..	..	..	..
	(b) Mechanical filters.	30' × 15' × 10' each.	30' × 15' × 10' each.	..	..	30' × 15' × 10' each.	..	..	..	..	..	..	..	..	..	..	..	..	..

APPENDIX No. V—(*continued*).

Details of pumps, filters, tanks, reservoirs, rising mains, etc., in the water works of the United Provinces for 1930-31.

Item No.	Particulars.	Agra.	Allahabad.	Benares.	Cawnpore.	Lucknow.	Meerut.	Mussoorie.	Nainital.	Dehra Dun.	Jhansi.	Mirzapur.	Mathura.	Pyagbad.	Hardwar.	Unao.	Rosa.	Pataipur-Sikri.	Aligarh.
13	Number of clear water reservoirs.	Three ..	Two ..	Two ..	Three ..	Two ..	One ..	Six ..	One ..	..	..	..	..	..	..	..	..	..	..
14	Size of clear water reservoirs.	109' X 109' X 10' each.	110·9' X 181·3' X 12' each.	178½' X 289½' X 12' each.	Two old—155' X 106½' X 14' each. One new—155' X 200' X 12'.	107' X 159' X 13' each.	72½' X 49' X 7'	1. 48' X 55' X 8' Murray spring. 2. 30' X 30' X 18' Mashinoo spring. 3. 48' X 55' X 6' Ballarta spring. 4. 3—14' dia. X 10' each. Landour.	47' X 40' X 6' ..	..	..	..	..	..	..	..	..	..	..
15	Capacity of clear water reservoirs. Gallons.	470,000 each ..	1,169,700 each ..	1,364,005 each ..	Two old—953,700 each. One new—2,055,000.	793,500 each ..	110,880 ..	1. 60,000 2. 20,000. 3. 60,000. 4. 10,000 each.	57,800	..	..	..	..	..	..	..	..	..	..
16	Number of service reservoirs.	Four ..	One ..	One ..	Two ..	One ..	Two ..	Eight ..	Eighty-eight ..	..	Nine ..	One ..	Two ..	One ..	Two ..	One ..	One ..	One ..	One
17	Size of service reservoirs.	E. Z. (1) 60' dia. X 114' deep. L. Z. (2) 48' X 16' X 8' each. (4) 60' X 16' X 8'.	53·58' dia. X 31' deep.	62' dia. X 15' deep.	30·5' X 30' at parade. 50·5' X 40' at water works.	60' X 60' X 12' ..	36' X 34' each ..	Gun Hill. 1. 78' X 37½' X 12'. 2. 30' X 20' X 8' Vincent Hill. 3. 48' X 35' X 8' 4. 40' X 55' X 8' 5. 30' X 95' X 8' Sawy Hill. 6. 28' X 28' X 6' Landour Hill. 7. 3—14' dia. X 12' inch. Dhulkia. 8. 4—14' dia. X 12' each.	Small .. 81 Large .. 6 Small. 63—8' X 8' each. 39—5·6' X 8' each. 1—8' X 8'. 3—4' X 5' each. 17—8' X 8' X 4' each. Large 1—80' X 15' X 9·5' 1—20·6' X 15' X 9·6'. 1—30' X 12'. 1—12' X 10'. 2—35·6' X 10·6' each.	..	1—40' X 13' X 8' 1—4' X 4' X 4'. 6—5' X 5' X 5' each.	200' X 75' X 14' deep.	37' X 37' each ..	39—1½' dia. X 12'—6' deep.		62'—8' X 60' X 12' each.	30' X 30' X 8' ..	12' dia. X 14·6' ..	37' X 37' X 4' ..	46·6' X 56·6' X 11·6'.
18	Capacity of service reservoirs. Gallons.	E. Z. 275,000 L. Z. 3—24,000 each. 1—43,000	500,000	325,000	At Parade 93,306 At water-works 395,765	350,000	100,000 each	(1) 213,975 (2) 90,000 (3) 60,000 (4) 50,000 (5) 50,000 (6) 65,175 (7) 60,000 (8) 40,000	268,070	..	1—90,000 1—400 7—770 each	1,210,000	100,000 each.	120,000	250,000 each	20,000	10,000	10,000	200,000
19	Number of public standposts:—																		
	One tap ..	243	179	91	78	287	44	5	13	35	2	93	307	15	2	50	6	1 (Fitted with W. N. cocks.	43
	Two taps ..	74	66	78	81	180	..	35	..	43	6	97	65	43	26	13	5	2 (Fitted with W. N. cocks.	48
	Four taps ..	65	89	73	81	..	..	..	..	Three taps 6 4	Three taps 3 6				3	1	..		..
	W. N. Cocks ..	199	64	53	68	94	9	..	..	..	..	9	..	..	..	..	..		1
	Ribcocks ..	3	200	1	112	2	5	163	..	..	..	93	..	20	..	18	..		..
	Push cocks ..	65	31	..	..	..	3	..	..	..	..	33	..	..	..	..	..		..
	Wall fountains ..	2	..	34	3	..	..	..	..	..	..	..	..	..	3 (Garden fountain)	..	..		..
	Other types ..	7	15	3	..	..	..	1	3	..	..	..	..	..	37	..	15	..	..
	Total ..	665	631	511	607	513	140	38	167	86	30	205	346	107	17	81	13	21	91
20	Number of fire hydrants.	142	128	87	159	303	91	..	50	..	..	122	3	4	3	12	1	..	30
21	Number of road watering posts or standpipes.	49	137	189	15	26	Sprin posts 6 Ocks 84	10	..	4	12	8	8	17	4	7	..	..	..
22	Number of mains lengths.	84	45	63	84	45	17	3	5	3	4	17	11	7	13	..	..	..	..
													Washing mains 3 Washing pipes 18 Urinal flushing mains 1 Water flushing lanches 1 Fire hydrants 1 Connections to fire hydrants pump 1						

APPENDIX No. VI.

Detailed estimate of expenditure incurred on health works under supervision of the Superintending Engineer, Public Health department, during the year 1930-31.

Serial number.	Name of places.	Water works original and special repairs.	Water works maintenance.	Drainage works.	Other works.	Total.
		Rs.	Rs.	Rs.	Rs.	Rs.
1	Agra	17,616	1,67,846	5,736	..	1,91,198
2	Aligarh	1,66,660	5,323	..	..	1,71,983
3	Allahabad	32,781	2,39,900	10,514	9,834	2,93,029
4	Allahabad Magh Mela ..	19,715	1,870	..	*10,360	31,945
5	Almora	1,40,415	..	5,319	..	1,45,734
6	Atrauli	103	..	301	2,692	3,096
7	Atsalia (Hardoi)	..	..	250	..	250
8	Azamgarh	..	..	58	323	381
9	Bahraich	2,201	..	11,314	..	13,515
10	Ballia..	698	..	771	85	1,554
11	Banda..	28	..	22	6,118	6,168
12	Baraut	100	..	50	9,515	9,665
13	Bareilly	1,790	..	637	†319	2,746
14	Benares	71,958	2,34,523	38,000	..	3,44,481
15	Bijnor..	210	..	422	1,282	1,914
16	Bisalpur	204	..	554	..	758
17	Brindaban	2,892	..	1,404	‡11,067 / 362	5,725
18	Budaun	..	..	52,175	1,529	53,704
19	Bulandshahr	..	..	235	..	235
20	Chandausi	464	..	2,003	..	2,467
21	Cawnpore	21,778	2,94,343	1,74,778	39,615	5,30,514
22	Dehra Dun	3,546	9,231	14,681	..	27,458
23	Dhampur	..	..	..	407	407
24	Etah	..	..	413	108	521
25	Etawah	..	..	1,240	522	1,762
26	Fatehpur	..	..	996	..	996
27	Fatehpur Sikri	2,444	3,163	..	..	5,607
28	Fyzabad	887	27,141	324	3,558	31,860
29	Ghaziabad	971	..	1,969	3,502	6,442
30	Ghazipur	382	..	2,491	2,892	5,655
31	Gorakhpur	..	..	3,993	3,571	7,564
32	Gonda..	..	..	..	6,988	6,988
33	Haldwani	5,585	..	1,404	1,697	8,686
34	Hardwar	2,500	27,012	989	73	30,524
35	Hathras	*10,895	..	959	..	11,854
36	Jaunpur	..	..	489	16,030	16,519
37	Jhansi	..	15,419	11,043	..	26,462
38	Jhansi Chirgaon	..	..	29,954	..	29,954
39	Kaimganj	..	..	..	793	793
	Carried over ..	5,06,678	10,25,771	3,75,438	1,23,182	20,31,064

* Electric supply. † Anti-malarial works. ‡ Infectious Diseases Hospital.

APPENDIX No. VI—(*concluded*).

Detailed estimate of expenditure incurred on health works under supervision of the Superintending Engineer, Public Health department, during the year 1930-31.

Serial number.	Name of places.	Water works original and special repairs.	Water works maintenance.	Drainage works.	Other works.	Total.
		Rs.	Rs.	Rs.	Rs.	Rs.
	Brought forward ..	5,06,673	10,25,771	3,75,498	1,23,182	20,31,064
40	Kairana	..	..	545	1,322	1,867
41	Kanauj	988	..	..	..	988
42	Kasganj	..	..	765	..	765
43	Khurja	2,510	..	285	†61,510 5,396	69,701
44	Kosi	557	6,967	490	3,528	10,932
45	Lakhimpur	..	..	1,791	..	1,791
46	Lalitpur	..	..	164	105	269
47	Lucknow	1,21,546	2,87,012	10,428	835	4,19,821
48	Meerut	1,648	32,598	674	..	34,920
49	Mirzapur	4,415	7,608	1,270	1,063	14,356
50	Mogal Sarai ..	100	..	641	625	1,366
51	Mussoorie	16,276	71,709	2,501	2,621	93,002
52	Muttra	27,377	56,351	*3,427 659	..	88,314
53	Muzaffarnagar	..	..	56,531	..	56,531
54	Nagina	1,095	..	..	1,001	2,096
55	Naini Tal	3,744	43,077	1,856	3,005	51,682
56	Najibabad	5,124	..	3,662	7,795	16,581
57	Nawabganj (Bara Banki) ..	..	..	2,004	387	2,391
58	Orai	..	..	502	..	502
59	Pilibhit	176	..	1,161	128	1,465
60	Rae Bareli	110	..	470	40	620
61	Roorkee	774	..	870	435	2,079
62	Saharanpur	..	..	19,054	923	19,977
63	Sahaswan	220	..	976	2,275	3,471
64	Shahjahanpur	..	..	337	7,323	7,660
65	Sambhal	..	..	2,396	..	2,396
66	Sikandrabad	..	..	..	242	242
67	Sikandra Rao	334	..	960	118	1,412
68	Soron	..	..	2,103	362	2,465
69	Sultanpur	245	..	534	166	945
70	Sandila	180	..	360	140	680
71	Sitapur	..	..	872	1,553	2,425
72	Tanda	..	..	197	..	197
73	Tilhar	..	..	589	..	589
74	Ujhaini	..	..	515	..	515
75	Unao	7,458	8,361	1,499	3,326	20,619
	Total ..	7,01,420	15,38,864	4,96,516	2,29,406	29,66,196

* Sewage Farm. † Electric supply.

APPENDIX No. VII.

Comparative statement of fuel consumption, working expenses and receipts of various water works in the United Provinces during the year 1930-31.

Serial number.	Name of water works.	Class of work, gravitation or pumping.	Fuel consumed.		Fuel consumption per 1,000 foot gallons.	Price of fuel per ton.	Total (average) lift.	Percentage of charges for— Establishment.	Fuel.	Oil and waste.	Repairs to machinery.	Other charges.	Per 1,000 gallons. Total working cost.	Total receipt.	Per head per annum. Total working cost.	Total receipt.	Profit or loss.	Remarks.
1	2	3	4		5	6	7	8	9	10	11	12	13	14	15	16	17	18
			Tons.		lbs.	Rs.	Feet.						As.	As.	As.	As.	As.	
1	Agra	Pumping ..	(1)	4,152·46	0·02408	15·94	188·78	25·56	42·28	5·29	0·06	26·81	1·83	2·30	20·17	25·27	5·10	Profit.
2	Allahabad.. ..	Ditto	(2)		..	..	228·04	24·61	63·52	0·72	0·44	10·71	2·37	2·99	40·43	42·16	1·73	Do.
3	Benares	Ditto	(3)	10,953·14	0·05199	13·72	176·31	25·45	62·69	0·86	1·06	9·94	1·94	1·85	26·19	25·01	1·18	Loss.
4	Cawnpore	Ditto	(4)		..	..	140·80	19·70	41·55	0·23	0·52	38·00	1·74	2·72	24·31	38·10	13·79	Profit.
5	Lucknow	Ditto	(5)		..	..	154·94	15·72	62·80	0·02	1·59	19.87	2·64	3·29	33·06	41·14	8·08	Do.
6	Meerut	Turbines worked by water power.	(6)		..	..	141·74	53·45	..	1·87	2·71	41·97	1·15	1·16	6·71	6·77	0·06	Do.
7	Mussoorie	Pumping and gravitation.	..		..	..	Av. 1,304·05	19·59	55·93	0·14	3·11	21·23	13·99	11·69	105·22	87·92	17·30	Loss.
8	Naini Tal	Ditto ..	(7)		..	..	Av. 460·01	15·80	73·87	0·39	2·93	7·01	16·00	21·66	63·44	85·86	22·42	Profit.
9	Dehra Dun ..	Gravitation ..	..		..	..	..	77·08	..	..	..	22·92	3·21	1·81	10·37	5·83	4·54	Loss.
10	Jhansi	Pumping ..	(8)	497·80	0·08502	13·35	228·52	23·89	32·01	1·43	1·32	41·35	4·20	4·35	9·87	10·21	0·34	Profit.
11	Mirzapur	Gravitation ..	..		..	..	..	81·65	..	..	..	18·35	1·34	1·29	12·25	11·77	0·48	Loss.
12	Muttra	Pumping ..	(9)		..	..	174·10	22·93	75·14	0·35	0·22	1·36	4·87	4·45	28·04	25·60	2·44	Do.
13	Fyzabad	Ditto ..	(10)	66·30	0·00656	140·00	140·56	49·73	29·37	6·98	2·48	11·44	3·83	4·17	20·57	22·42	1·85	Profit.
14	Hardwar	Ditto ..	..		..	..	175·53	31·33	61·27	0·38	1·30	5·72	7·10	10·79	68·15	103·56	35·41	Do.
15	Unao	Ditto	(11)	19·94	0·00620	157·08	130·00	30·23	31·71	21·74	9·72	6·60	2·41	2·10	14·86	12·92	1·94	Loss.
16	Kosi	Ditto	(12)	4·63	0·00812	150·00	111·18	59·71	9·88	5·09	10·34	14·98	6·69	9·53	15·09	21·49	6·40	Profit.
17	Fatehpur-Sikri ..	Ditto	(13)	3·59	0·00370	145·46	202·72	51·94	20·68	8·72	0·16	18·50	4·72	..	11·50	*..	..	..
18	Aligarh	Ditto	(14)		..	..	185·00	34·02	57·47	0·28	1·03	7·20	27·41	..	7·34	*..	..	..

(1) Coal 3,299·90 tons, fuel oil 102·25 tons and Electrical charges Rs. 1,516 for Maithan and Chili-Int and Rs. 10,444 for Raw Water Pumping Plant converted into coal and fuel oil 750·31 tons.
(2) Pumping done by Electric motors. 57·80 tons of coal used for workshop and 11·72 tons of fuel oil for Daraganj.
(3) Coal 916·76 tons and electrical charges Rs. 1,37,699 converted to coal 10,036·38 tons coal consumption includes 92·04 tons for municipal purposes
(4) Pumping done by Electric motors. 156·70 tons of coal were used (58·85 tons for workshop and 97·85 tons for Municipal purposes).
(5) Pumping done by Electric motors. 24·07 tons of coal were used (16·07 tons for workshop and 8·00 tons for Municipal purposes).
(6) Pumping done by Turbine pumps. Wood consumption 12·00 tons for other purposes.
(7) Pumping done by Electric motors. 1·75 tons of coal used for Municipal purposes
(8) Includes 5·55 tons of coal for Municipal purposes.
(9) Pumping done by Electric motors. 0·92 tons of fuel oil were used (0·84 tons for pumping 2·457 million gallons of water by Diesel Engines and 0·08 tons for Municipal purposes).
(10) Includes 0·65 ton of fuel oil for Municipal purposes and 0·54 ton for shortage, etc.
(11) Fuel oil.
(12) Includes 0·24 ton of fuel oil for shortage.
(13) Includes 0·03 ton of fuel oil for shortage.
(14) Pumping done by Electric motors.

APPENDIX No. VIII.

Statement showing initial capital cost, details of income and expenditure for water works in the United Provinces for the year 1930-31.

Serial no.	Particulars.	Agra.	Allahabad.	Benares.	Cawnpore.	Lucknow.	Meerut.	Mussoorie.	Naini Tal.	Dehra Dun.	Jhansi.	Mirzapur.	Muttra.	Fyzabad.	Hardwar.	Unao.	Kosi.	Fatehpur-Sikri.	Aligarh
1	Description of plant ..	Oil Engine, steam power and Electric motors.	Steam power, oil engine and electric motors.	Steam power and electric motors.	Steam power and electric motors.	Electric motors.	Water turbines and steam power.	Gravitation and electric motors.	Gravitation and electric motors.	Gravitation.	Steam power.	Gravitation.	Oil engine and electric motors.	Oil engine and electric motors.	Electric motors.	Oil engine.	Oil engine.	Oil engine.	Electric motors.
2	Initial capital cost in Rupees lakhs.	11·71	16·24	25·62	14·45	15·16	7·52	4·80	2·47	0·97	0·97	5·98	5·17	9·49	1·97	1·19	0·70	0·52	5·71
3	Total cost of works in „ lakhs.	35·48	44·41	43·94	36·26	64·12	8·21	12·82	10·52	4·78	1·94	7·34	6·21	9·95	4·88	1·44	0·71	0·52	5·72
4	Number of inhabitants drawing their supply from mains.	135,946	157,220	193,447	216,436	210,000	77,711	15,339	17,319	34,092	25,000	33,400	42,615	30,000	9,024	9,000	6,753	4,400	60,948
5	Hours of supply daily ..	10·00	15·50	8·55	16·00	22·00	16·00	24·00	13·23	24·00	9·00	22·00	6·75	8·75	18·00	9·00	10·00	8·00	6·00
6	Quantity supplied during year in million. Gallons	2,045·720	2,216·336	2,676·660	3,021·300	2,323·424	453·692	115·007	68·660	110·000	58·678	349·938	245·347	161·105	36·586	55·380	15·228	10·713	16·320
7	Total Horse Power hours per annum in million.	1·47	1·12	1·20	1·41	0·76	0·29	0·76	0·16	..	0·07	..	0·22	0·11	0·03	0·04	0·01	0·01	0·01
8	Maximum daily average during any one month in million. Gallons.	5·943	7·325	7·731	9·626	8·484	1·400	0·405	0·285	0·435	0·223	1·036	0·785	0·488	0·391	0·190	0·046	0·041	0·128
9	Average daily supply for „ the year in million.	5·605	6·072	7·333	8·278	7·231	1·242	0·315	0·188	0·301	0·161	0·959	0·672	0·441	0·237	0·152	0·042	0·029	0·116
10	Maximum supply per head „ per day.	37·34	46·59	38·96	44·47	40·40	18·01	26·68	16·45	12·76	8·92	26·98	18·42	16·27	43·38	21·11	6·81	9·32	2·10
11	Average supply per head „ per day.	30·14	33·62	36·95	38·24	34·29	15·99	20·61	10·86	8·84	6·43	24·97	15·77	14·71	26·29	16·86	6·18	6·67	1·90
12	Total lift (average) .. Feet..	188·73	228·04	176·31	140·30	154·94	141·74	1,304·05	460·01	Gravity supply.	229·52	Gravity supply.	174·10	140·00	175·58	130·00	111·18	202·72	135·00
13	Quantity supplied during year in million foot gallons.	386,191	505,137	471,922	425,395	437,243	64,293	149,975	81,584	..	13,116	..	42,715	32,645	15,198	7,199	1,693	2,172	2,203
14	Fuel consumed .. Tons..	(a) 4,152·40	..	(b) 10,953·14	..	..	..	..	..	..	(c) 497·80	..	..	(d) 36·80	..	(e) 19·94	(f) 4·63	(g) 3·59	..
15	Fuel consumption per million foot gallons. Lbs...	24·08	..	51·99	..	..	..	..	..	..	85·02	..	..	6·56	..	6·20	6·12	3·70	..
16	Cost of fuel per ton .. Rupees	15·94	..	13·72	..	..	..	..	..	..	13·35	..	..	140·00	..	157·03	150·00	145·46	..

17	Cost of establishment per million foot gallons.	Annas.	1·78	1·87	2·02	2·18	1·77	4·34	1·50	3·45	..	4·49	..	4·84	9·54	8·91	5·61	35·93	12·10	13·15
18	Cost of fuel per million foot gallon.	„	2·94	4·82	4·99	4·60	7·08	..	4·23	16·12	..	6·02	..	15·38	5·63	17·42	5·39	5·94	4·82	22·22
19	Cost of oil and waste per million foot gallon.	„	0·37	0·06	0·07	0·02	..§	0·15	0·01	0·03	..	0·27	..	0·07	1·34	0·11	4·04	3·06	2·03	0·11
20	Cost of repairs to machinery per million foot gallons.	„	..*	0·03	0·08	0·06	0·18	0·22	0·24	0·64	..	0·25	..	0·05	0·48	0·87	1·81	6·22	0·04	0·40
21	Cost of other charges per million foot gallons.	„	1·86	0·81	0·79	4·21	2·24	3·40	1·62	1·53	..	7·78	..	0·29	2·19	1·63	1·23	9·02	4·31	2·78
22	Total charges per million foot gallons.	„	6·95	7·59	7·95	11·07	11·27	8·11	7·65	21·82	..	18·81	..	21·11	19·18	23·44	18·53	60·17	23·30	38·66
23	Maintenance charges per thousand gallons supplied.	„	1·31	1·73	1·40	1·56	1·75	1·15	9·98	10·04	1·34	4·20	0·35	3·67	2·70	4·99	2·41	6·69	4·72	5·22
24	Interest and sinking fund charges per thousand gallons supplied.	„	0·52	1·14	0·54	0·18	0·89	..	4·01	5·96	1·87	..	0·99	1·20	1·13	2·11	..	..	..	22·19
25	Total (maintenance and interest and sinking fund per thousand gallons supplied).	„	1·83	2·87	1·94	1·74	2·64	1·15	13·99	16·00	3·21	4·20	1·34	4·87	3·83	7·10	2·41	6·69	4·72	27·41
26	Maintenance charges in thousand.	Rupees.	157·84	239·90	234·52	294·34	287·01	32·60	71·71	43·08	9·23	15·42	7·61	56·35	27·14	27·01	8·36	6·37	3·16	5·32
27	Interest and sinking fund charges in thousand.	„	66·57	157·40	90·25	34·52	146·94	..	28·83	25·59	12·38	..	21·79	18·35	11·43	11·43	..	..	..	22·64
28	Total income in thousand	„	293·72	414·30	310·16	515·41	540·01	32·87	84·01	92·94	12·44	15·95	28·26	68·21	42·05	58·41	7·27	9·07	..	..
29	Profit or loss on maintenance in thousand.	„	+125·83	+174·40	+75·64	+221·07	+253·00	+0·27	+12·30	+49·86	+3·21	+0·53	+20·65	+11·86	+14·91	+31·40	—1·09	+2·70	..	..
30	Profit or loss on maintenance and interest and sinking fund in thousand.	„	+59·31	+17·00	—14·61	+186·55	+106·06	+0·27	—16·53	+24·27	—9·67	+0·53	—1·14	—6·49	+3·48	+19·97	—1·09	+2·70	..	..
31	Profit or deficit percentage on total cost of works.	„	+1·67	+0·38	—0·33	+5·14	+1·65	+0·03	—1·29	+2·31	—2·02	+0·27	—0·15	—1·04	+0·35	+4·13	—0·76	+3·79	..	..

* Only Rs. 98 were spent. Cost per million foot gallons works out to 0·004 annas.
§ Only Rs. 69 were spent. Cost per million foot gallons works out to 0·003 annas.
(a) Coal, fuel oil and Electrical energy converted into coal and fuel oil.
(b) Coal and Electrical energy converted into coal.
(c) Coal.
(d) Fuel oil.
(e) Do.
(f) Do.
(g) Do.

APPENDIX No. IX.

HYDRO-ELECTRIC SUPPLY.

1930-31.

Particulars.	Mussoorie.	Naini Tal.
1. Total units generated	3,520,048	1,054,510
2. Maximum units for any one day	11,225	3,723
3. Average load K. W.	383·00	157·50
4. Power Factor—		
Maximum	0·95	0·94
Minimum	0·75	0·24
5. Load Factor—		
Maximum (monthly)	0·46	0·45
Average		
Minimum (monthly)		
6. Generating Volts—		
Maximum	7,000	3,500
Minimum	6,600	3,500
7. Total hours of running	10,803·75	8,739·76
8. Total cubic feet of water used	191,538,780	37,761,020
9. Maximum quantity used in any month, cubic feet ..	18,703,120	3,486,800
10. Minimum quantity used in any month, cubic feet ..	8,545,800	2,687,940
11. Average rate of discharge, cubic feet per diem	524,763	103,455
12. Maximum rate of discharge of pipe line		
No. 1, cubic feet per second	8·30	Both the lines worked together.
No. 2, cubic feet per second	8·30	
13. Minimum rate of discharge of pipe line		
No. 1, cubic feet per second	7·30	
No. 2, cubic feet per second	7·30	
14. Average intake level	4,491	8·97
15. Maximum intake level		11·70
16. Minimum intake level		6·25
17. Total rainfall for the year, inches	101·40	107·82
18. Total cubic feet overflow intake weir (million cubic feet) (Naini Tal only)	..	101·64
19. Maximum recorded rain fall for 24 hours, inches ..	4·40	5·40

APPENDIX No. IX(A).

Electric Supply.

1930-31.

Particulars.	Hardwar.
1. Total units received	389,602
2. Maximum units for any one day	1,275
3. Average load K. W.	52
4. Power factor—	
Maximum	0·85
Minimum	0·80
5. Load Factor—	
Maximum (monthly)	Nil.
Average	Nil.
Minimum (monthly)	Nil.
6. Receiving Volts—	
Maximum	430
Minimum	380

APPENDIX No. X.

Statement showing current consumed, rate charged and revenue derived.

1930-31.

	Mussoorie.			Naini Tal.			Hardwar.		
	Units.	Rate.	Rs.	Units.	Rate.	Rs.	Units.	Rate.	Rs.
1. For Municipal purposes—									
Public lighting.. ..	162,421 (a)7,482 (b)177,844 (c)62,085	Two annas ..	*43,468	129,153	Lump sum ..	21,000	61,900	Three annas and seven pies.	13,443
		Contract rate ..	28,203						
W. S. pumping ..	641,826	One anna ..	40,114	‖178,160	Three annas ..	†32,467	127,559	Two annas.. ..	16,551
Other purposes ..	461,581	..	..	121,777	..	8,474	2,955	Three annas and seven pies.	689
2. Sold by meter—									
Lighting	229,264 (b)347,549	Six annas ..	85,974				¶48,944	Six annas.. ..	16,498
		Six annas ..	1,30,331	201,708	Eight annas ..	78,443	**44,912	Four annas ..	11,324
Heating	100,392 (b)914,192	One anna ..	6,287	120,544	One anna four pies..	7,498	..	..	..
		One anna ..	32,187						
Power	..	..	..	3,846	Four annas ..	722	76,487	One anna and six pies	7,407
3. Recoveries on rated premises—	26,195	Contract rate ..	9,828	26,784	Rupees two per mensem per lamp.	7,584	15,650	..	4,080
	(b)31,957	Ditto ..	11,984						
4. Other receipts ..	..	..	3,627						
	..	..	(b)30,178	391	..	5,884	..	..	1,780
5. Meter rent and miscellaneous.	..	..	5,915						
	..	..	(b)10,421	..	..	10,250	..	..	3,329
6. Total units sold and receipts	‡2,301,357	..	4,33,523	§967,663	..	1,66,787	372,737	..	75,052

(a) For Landour.
(b) For Dehra Dun.
(c) For Dehra Dun road lighting.

*Credit.
†Includes Rs. 650 for units consumed for lake side plant.
‡Does not include 491,581 units for other purposes.
§Does not include 110,200 units for other purposes allowed free of charge.
‖168,708 units for main pumping and 8,457 units for lake side.
¶Private.
**Railway.

APPENDIX No. XI.

Statement showing number of connexions.
1930-31.

Particulars.	Mussoorce.		Naini Tal.		Hardwar.	
	Number.	K. W.	Number.	K. W.	Number.	K. W.
1. Private connexions at close of preceding year.	(a)4,578	..	1,403	..	467	..
2. Connexions made during the year.	(b) 287	..	86	..	33	..
3. Metered connexions existing on March 31, 1931.	(c)2,331	..	789	..	258	..
4. Municipal lamps existing on March 31, 1931.	(d)1,802	..	540	..	518	..
5. Heating points connected on March 31, 1931.	(e)501	..	227	..	..	..
6. Total K. W. connected on March 31, 1931.	..	4,280	..	1,630	..	324
7. Peak load for the year ..	..	H. E. 942 Diesel. 630	..	315	..	95
8. Diversity factor per cent.	..	45%	..	19·32%	..	..

NOTE.—Connexions for Dehra Dun included:—
(a) 2,612.
(b) 171.
(c) 1,338.
(d) 988 for Dehra Dun and 60 for Landour.
(e) Power points.

APPENDIX No. XII.

Hydro-electric supply—Annual maintenance account.
1930-31.

Particulars of charges.	Mussoorie.	Naini Tal.
I.—Staff Charges—		
(a) Direction	28,361	5,875
(b) Office establishment	19,760	11,219
(c) Power station staff	20,826	3,638
(d) Sub-station staff	6,308	1,310
(e) Pipe line staff	..	1,162
(f) Overhead line staff	14,980	4,837
(g) Auxiliary pump	..	250
(h) Contingencies	6,796	3,858
II.—Materials—		
(a) Oils		
(b) Lubricants	33,247	1,797
(c) Waste		
(d) Buildings		
III.—Repairs—		
(a) Machinery	*9,808	3,662
(b) Pipe line	4,201	378
(c) Overhead line	13,306	6,509
(d) Buildings	3,794	201
IV.—Rents	3,280	511
V.—Printing	999	184
VI.—Stationery	499	495
VII.—Insurance	1,316	132
VIII.—Total maintenance charges	1,67,231	46,019
IX.—Interest and sinking fund charges	1,83,415	1,42,818
X.—Total annual charges	3,50,696	1,88,837
XI.—Total units generated	3,520,048	1,054,510
XII.—Total units sold	2,301,357	667,668
XIII.—Cost per units generated Annas	1·59	2·86
XIV.—Cost per unit sold Annas	2·44	4·52

*Includes Rs. 4,997 for lamps and Rs. 3,490 for meters.

APPENDIX No. XII (A).

Electric Supply.

Annual Maintenance Account.

1930-31.

Particulars of charges.	Hardwar.
	Rs.
I.—Staff charges.—	
(*a*) Direction	2,930
(*b*) Office establishment	1,516
(*c*) Sub-station staff	1,430
(*d*) Overhead line staff	2,783
(*e*) Contingencies	..
II.—Cost of electric energy purchased during the year from Irrigation department	44,465
III.—Materials.—	
(*a*) Oils	..
(*b*) Lubricants	..
(*c*) Waste	..
(*d*) Buildings	..
IV.—Repairs.—	
(*a*) Machinery	..
(*b*) Overhead line including cost of bulbs	1,410
(*c*) Buildings	285
V.—Rents	60
VI.—Printing	225
VII.—Stationery	140
VIII.—Insurance	..
IX.—Miscellaneous .. (*a*) Service	1,304
IX.—Miscellaneous .. (*b*) Capital outlay	1,669
X.—Total maintenance charges	58,217
XI.—Interest and Sinking Fund charges	14,752
XII.—Total annual charges	72,969
XIII.—Total receipts during the year	75,052
XIV.—Total units purchased	3,89,602
XV.—Total units sold	3,72,757
XVI.—Profit during the year	2,083
XVII.—Total loss in transformer and transmission, etc.	16,845
XVIII.—Cost per unit purchased	3·00 Annas.
XIX.—Cost per unit sold	3·13 Annas.

APPENDIX No. XIII.

A.—List of projects finally sanctioned during the year 1930-31.

I.—Provincial Works.

		Rs.
(a) *Fair projects*—		
1.	Allahabad Drainage of an insanitary ditch near district jail ..	11,308
2.	Allahabad Magh Mela electrification for the year 1930-31 ..	11,378
3.	Allahabad Magh Mela water supply, 1931	13,632
4.	Allahabad Magh Mela water supply estimate of cost of land required for the construction of an additional well ..	289
5.	Allahabad Magh Mela water-supply, maintenance for the year 1931	1,302
6.	Cawnpore Agricultural College water supply, drainage and sewage disposal by activated sludge system	1,18,516
7.	Dewa (Bara Banki) fair water supply	57,850
8.	Etawah Kutchery compound, 5 ft. masonry well	3,786
9.	Garhmuktesar, special repairs to the well near the Police Station	153
10.	Lucknow, anti-malarial and drainage works, Ghaziuddin Hyder canal, maintenance—	14,000
11.	Lucknow, sanitary fittings in the residence of Electrician, Government House	1,054
12.	Lucknow, sanitary fittings in the residence of Garage Superintendent, Government House	1,434
13.	Lucknow, sanitary fittings in the quarters of Indian Aides de Camp, Government House	773
14.	Lucknow, sanitary fittings in the residence of Stenographer, Government House	1,517
15.	Lucknow, sanitary fittings in the residence of Hon'ble President, Legislative Council	4,305
16.	Lucknow, overflow jail water supply	57,510
17.	Firan Kidiar (Roorkee), drainage improvements	3,724
	Total ..	3,02,445
(b) *Preliminary proposals*:—		
	Nil.	
(c) *Forecasts of costs finally approved*—		
1.	Agra Water Supply to Police lines, Alternative No. I	13,000
2.	Ditto ditto No. II	16,200
3.	Bareilly Mental Hospital, 5" tube well and pump house ..	7,360
4.	Shakumber Devi Fair (Saharanpur) water supply	21,200
	Total ..	57,660

II.—Deposit Works.

		Rs.
(a) *Fair projects*:—		
1.	Agra, extension to Raw Water Pumping Plant, additions and alterations	4,871
2.	Aligarh Water Supply (2nd revised)	5,63,245
3.	Benares Kashi Tirath Sudhar Trust three 6" trial bores along the Ganges	3,831
4.	Brindaban (Muttra), Infectious Diseases Hospital	44,636
5.	Brindaban Water Supply, 3rd trial bore	4,646
5A.	Do. supplementary for 4" tube well	3,265
6.	Ghoharpur (Dehra Dun), water-supply, cleaning and test pumping the well and replacing the existing pump	7,062
7.	Fatehpur Sikri Mela Water Supply	14,800
8	Haldwani Water Supply Improvement, replacement of existing 4" main by 6"	5,943
9.	Hathras Water Supply tube well nos. 3, 4 and 5 (revised)	34,800
10.	Kanauj Drainage "G" block	15,097
11.	Khurja Water Supply and flushing scheme	1,70,919
	First instalment	5,387
12.	Lucknow Water Supply reorganisation. New filtration plant—running of filters for three months	226
13.	Muttra Water Supply, additional tube well no. 5 (2nd revised) ..	55,311
14.	Muzaffarnagar New Mandi Drainage, addition and alterations ..	1,48,000
15.	Rikhi Kesh (Dehra Dun) Infectious Diseases Hospital	38,099
16.	Saharanpur Drainage, first instalment	2,05,165
17.	Unao Water Supply tube well no. 3. (Revised)	12,855
	Total ..	13,28,988

APPENDIX—XIII (*continued*).

A.—List of projects finally sanctioned during the year 1930-31.

	Rs.
(*b*) *Preliminary proposals*—	
1. Hardwar. Providing a reinforced concrete bridge and training of Lalta Rao	1,12,000
Total ..	1,12,000
(*c*) *Forecasts of costs*—	
1. Chandausi Water Supply	2,21,700
2. Haldwani Banbhulpur drainage	1,23,198
3. Hardwar. Constructing a laboratory for infectious diseases hospital ..	11,100
4. Kosi Drainage	62,000
5. Moghal Sarai Drainage	42,424
6. Sikandrabad *Drainage, main drain no.* I	44,800
Ditto ditto II	37,000
Total ..	5,42,222

B.—List of projects submitted but not sanctioned during the year 1930-31.

I—PROVINCIAL WORKS.

	Rs.
(*a*) *Fair projects*—	
1. Allahabad Alfred Park Water Supply	47,276
2. Bareilly Mental hospital tube well	6,832
3. Lucknow Government House, residences, sanitary fitting, (revised) ..	4,829
4. Mainpuri, Public Works department, inspection house tube well ..	4,548
5. Meerut, New Central Jail tube well	12,452
6. Naini Tal Secretariat clerks quarters, Sanitary fittings	10,041
Total ..	85,978
(*b*) *Preliminary proposals*—	
Nil.	
(*c*)—*Forecasts of costs*—	
1. Agra Civil Lines area, water supply 5" dia., slotted pipe tube well ..	10,000
2. Bahraich District Jail tube wells	3,500
3. Fatehgarh Central Jail two tube wells	6,500
4. Lucknow Bandoriabagh, residence of the Secretaries—sanitary fittings in—	26,090
Total ..	46,090

II—DEPOSIT WORKS.

	Rs.
(*a*) *Fair projects*—	
1. Bahraich Water Supply	3,15,204
2. Bahraich Syed Salar Fair water supply	59,562
3. Bahraich and Dargah Syed Salar Water Supply two tube wells ..	27,045
4. Budaun Drainage (revised)	89,360
5. Banbhulpura (Haldwani) Drainage 1st instalment..	42,120
6. Dehra Dun Water Supply, improvements to Kolukhat Rajpur, Dehra Dun pipe line	16,504
7. Fyzabad Water Supply, pumping station, Venturi meter removing to new site and construction	1,747
8. Gorakhpur Drainage	4,05,076
9. Unao Water Supply, tube well no. 3 (II revised estimate) ..	13,982
Total ..	10,70,600
(*b*) *Preliminary proposals*—	
1. Bareilly Slaughter House city improvement area drainage	1,16,197
Total ..	1,16,197
(*c*) *Forecasts of costs*—	
1. Agra Dayal Bagh Tube Well air-lift-cum-centrifugal pumping plant ..	11,023
2. Aligarh East Indian Railways, tube well for one hundred gallons per minute	8,000
3. Ditto for 200 gallon per minute	11,000
4. Bilsi (Budaun) Drainage	54,164
5. Gonda Water Supply	1,36,793
6. Najibabad Water Supply	1,85,400
Total ..	4,06,380

APPENDIX No. XIII (*continued*).

C.—List of projects under preparation with approximate amount (1920-31).

I.—Provincial.

		Rs.
	(*a*) *Fair projects*—	
1.	Fatehgarh New Police Lines Tube Well	2,350
2.	Meerut Central Jail Drainage	2,15,139
3.	Meerut Central Jail Water supply (revision)	2,15,995
	Total ..	4,33,484
	(*b*) *Preliminary proposals*—	
	Nil	
	(*c*) *Forecasts of costs*—	
1.	Budaun District Jail Water supply	10,000
	Total ..	10,000

II.—Deposits.

	(*a*) *Fair projects*—	
1.	Aligarh Water supply Extension, Tube Wells nos. 5, 6 and 7 ..	48,104
2.	Budaun Drainage Extension	25,000
3.	Cawnpore Sewage disposal	5,07,000
4.	Ghazipur Water Supply, Trial Tube Well	19,770
5.	Hardwar Improvements to Har-ki-pairi	3,00,000
6.	Jaunpur Water supply	4,00,000
7.	Moghal Sarai Drainage	42,000
8.	Muzaffarnagar Flushing Scheme	41,649
	Total ..	12,83,523
	(*b*) *Preliminary proposal*—	
1.	Cawnpore Drainage, Part VI	2,40,000
2.	Cawnpore Sewage, Pumping Station at Permat Re-organization ..	75,000
	Total ..	3,15,000
	(*c*) *Forecasts of costs*—	
1.	Bahraich Drainage Extension	90,000
2.	Ghazipur Water supply	2,00,000
3.	Gola Gokarannath Water supply Extension	10,000
4.	Hamirpur Drainage	20,000
5.	Ramnagar Drainage	50,000
	Total ..	3,70,000

D.—List of projects delayed for want of staff.

1.	Agra Drainage, 1st instalment ..	..
2.	Aligarh Water supply Extention, Tube Wells, nos. 5, 6 and 7	48,104
3.	Cawnpore Drainage, Part VI	2,40,000
4.	Cawnpore Sewage Pumping Station at Permat Re-organization ..	75,000
5.	Ghazipur Water supply Trial Tube Well	19,770
6.	Hamirpur Drainage	..
7.	Jhansi Survey and Drainage	7,00,000
8.	Lucknow Survey of defects of Drainage System and preparation of estimate for their removal	5,00,000
9.	Lucknow Water supply Re-organization underground reservoir ..	..
10.	Meerut Drainage first instalment	..
11.	Sultanpur Water-supply	1,00,000

Forecasts.

1. Agra Water Works, pressure survey of pipe lines
2. Fatehpur Sikri Water supply providing additional standposts.
3. Hardwar Town Planning of Bhopatwala.
4. Meerut, Impovements of Water supply in the civil lines.

Completion drawing of—

1. Allahabad Magh Mela Tube Well and Pumping Plants.
2. Fyzabad Water supply.
3. Lucknow Government House Unfiltered Water supply.
4. Lucknow Sewage Pumping station.

APPENDIX No. XIV.

Revenue derived from Sewage Farms during the year 1930-31.

—	Agra.	Allahabad.	Dehra Dun.	Lucknow.	Muttra.
1. Area under cultivation in acres ..	115	241	4·19	*685·62	55
2. Total rent realized from cultivators. Rs.	8,108	23,317	680	†9,319	4,187
3. Average rent per acre per annum, Rs.	70·40	96·75	62·29	37·00	76·20
4. Quantity of sewage treated in million gallons	Not available.	706·26	5·84	Not supplied as no meter has been fixed.	92·67
5. Average quantity of sewage consumed per acre per diem in gallons.	Not available.	8,028·5	3,822		4,616
6. Expenditure incurred on the maintenance of the farms. Rs.	2,851	5,005	Nil.	4,107	1,708
7. Revenue derived .. .. Rs.	8,108	‡24,699	680	6,682	4,187
8. Profit .. .. .. „	5,257	19,694	680	2,575	2,479
9. Loss .. .. .. „	Nil.	Nil.	Nil.	Nil.	Nil.

*Only 178 acres treated with sullage.
†Only Rs. 6,682 were realized as rent from area supplied with sullage.
‡Includes Rs. 3,000 cost of sullage supplied to Allahabad Agriculture Institute.

APPENDIX No. XV.

Statement showing expenditure on construction works carried out by the Engineering branch of the Public Health department, during 1930-31.

Serial number.	Name of works.	Estimated cost.	Total expenditure up to end of March 1930.	Expenditure incurred during the year.
	I.—Provincial Works.	Rs.	Rs.	Rs.
1	Agra Dayal Bagh Tube Well	13,329	9,574	35
2	Allahabad Magh Mela pumping from tube well ..	1,043	..	342
3	Allahabad Magh Mela pumping plant, maintenance 1930-31.	590	..	586
4	Allahabad Kumbh Mela Water Supply new tube well	17,988	15,090	82
5	Allahabad Magh Mela electrification	11,278	..	10,360
6	Allahabad Magh Mela Water Supply for 1930-31 ..	13,682	..	12,391
7	Ditto maintenance ..	1,302	..	1,234
8	Allahabad District Jail, insanitary ditch drainage near—	11,208	..	11,159
9	Cawnpore Well Boring Operations, division, demonstration tube well.	133	759	118
10	Dehi Patan (Gonda) tube well	6,367	92	5,446
11	Etawah kutchery combined 5' masonry well ..	3,786	..	1,129
12	Lucknow anti-malarial and drainage Works, Ghazi-ud-din Haider canal maintenance.	14,000	..	11,608
13	Lucknow overflow Jail Water Supply	57,510	..	53,721
14	Piran Kaliar Water Supply	39,337	5,957	9,425
15	Piran Kaliar drainage improvement	3,724	..	3,619
	Total ..			1,28,305
	II.—Deposit Works.			
1	Agra extension to Raw water pumping plant ..	90,567	67,628	8,925
2	Agra New Mechanical filtration plant	2,84,250	1,95,011	3,136
3	Ajodhya (Fyzabad) two tube wells	37,112	15,605	515
4	Aligarh Water Supply..	5,63,245	2,83,924	1,66,660
5	Almora Water Supply..	1,75,342	6,504	1,40,415
6	Larbhulpura (Haldwani) drainage scheme, 1st instalment.	42,120	..	500
7	Bareilly anti-malarial drainage outfall	10,347	..	319
8	Benares water supply extension reorganization ..	5,12,255	4,45,703	60,706
9	Bhimtal (Naini Tal) Water Supply, section I ..	6,400	6,017	147
10	Ditto ditto II ..	16,797	..	175
11	Brindaban Infectious Diseases Hospital	44,636	..	1,070
12	Brindaban Water Supply, experimental tube well ..	9,445	3,826	67
13	Brindaban Water Supply, third tube well	7,901	..	2,961
14	Budaun drainage	89,369	3,055	52,175
15	Dehra Dun water softening and chlorinating plant water supply.	64,871	50,056	3,517
16	Fatehpur Sikri Water Supply	48,976	41,692	2,444
17	Fyzabad water Supply extension	50,006	..	37
18	Haldwani water Supply improvements	5,948	365	5,535
19	Hathras water Supply, 12" strainerless tube well no. 2 ..	28,242	14,160	15
20	Hathras tube wells nos. 3, 4 and 5	34,800	517	10,880
21	Jhansi Chirgaon Drainage Improvement	34,388	98	29,954
22	Kaimganj Drainage	60,416	52,750	181
23	Khurja Water Supply, trial tube well	20,535	16,704	2,510
24	Khurja Electric Supply	1,86,224	87,020	61,510
25	Kosi Water Supply	1,02,132	70,316	6
26	Lucknow water Supply, additional mechanical, water filtration, sterilisation plant.	3,28,353	2,34,527	70,984
27	Lucknow Water Supply, reorganization, revision of distribution system.	9,90,140	92,009	25,546
28	Moradabad flushing improvements	11,504	7,624	2,317
29	Muttra laying Sewage Farm and Irrigation Gulls ..	7,522	3,953	2,692
30	Muttra Sewage Disposal Scheme	1,83,301	1,51,914	795
31	Muttra Water Supply, masonary tube well	26,984	921	12,616
32	Muttra Water Supply, additional tube well no. 5 ..	55,311	2,507	15,261
33	Muzaffarnagar New Mandi Drainage	4,63,447	44,539	16,591
34	Rikhikesh Infectious Diseases Hospital	33,039	..	1,625
35	Unao Water Supply, additional pumping plant ..	31,409	827	55
36	Unao Drainage	1,89,316	..	6,472
37	Unao Water Supply, tube well no. 3	12,855	398	6,079
	Total ..	..	..	7,54,502